SEQUENCE LISTING

<110> O'Donnell, Michael E.
Yuzhakov, Alexander
Yurieva, Olga
Jeruzalmi, David
Bruck, Irina
Kuriyan, John

<120> ENZYMES DERIVED FROM THERMOPHILIC ORGANISMS THAT FUNCTION AS A CHROMOSOMAL REPLICASE, PREPARATION AND USE THEREOF

<130> 22221/1030

<140> 09/716,964
<141> 2000-11-21

<150> 60/143,202
<151> 1997-04-08

<150> 08/823,407
<151> 1997-04-08

<150> 09/057,416
<151> 1998-04-08

<160> 212

<170> PatentIn Ver. 2.1

<210> 1
<211> 2007
<212> DNA
<213> Thermus thermophilus

<400> 1
tccgggggtg gggttcccag gtagaccccg gcccctcccg tgagcccctt tacccaggcc 60
gccacctcct ccaggggggc caaggcgtgc aaggagagga acgtccgcac cacgccctat 120
actagccttg tgagcgccct ctaccgccgc ttccgccccc tcaccttcca ggaggtggtg 180
gggcaggagc acgtgaagga gcccctcctc aaggccatcc gggaggggag gctcgcccag 240
gcctacctct tctccgggcc caggggcgtg ggcaagacca ccacggcgag gctcctcgcc 300
atggcggtgg ggtgccaggg ggaagacccc ccttgcgggg tctgccccca ctgccaggcg 360
gtgcagaggg gcgcccaccc ggacgtggtg gacattgacg ccgccagcaa caactccgtg 420
gaggacgtgc gggagctgag ggaaaggatc cacctcgccc ccctctctgc ccccaggaag 480
gtcttcatcc tggacgaggc ccacatgctc tccaaaagcg ccttcaacgc cctcctcaag 540
accctggagg agcccccgcc ccacgtcctc ttcgtcttcg ccaccaccga gcccgagagg 600
atgcccccca ccatcctctc ccgcacccag cacttccgct tccgccgcct cacggaggag 660

gagatcgcct ttaagctccg gcgcatcctg gaggccgtgg ggcgggaggc ggaggaggag 720
gccctcctcc tcctcgcccg cctggcggac ggggccctta gggacgcgga aagcctcctg 780
gagcgcttcc tcctcctgga aggccccctc acccggaagg aggtggagcg cgccctaggc 840
tccccccag ggaccggggt ggccgagatc gccgcctccc tcgcgagggg gaaaacggcg 900
gaggccctgg gcctcgcccg gcgcctctac ggggaagggt acgccccgag gagcctggtc 960
tcgggccttt tggaggtgtt ccgggaaggc ctctacgccg ccttcggcct cgcgggaacc 1020
ccccttcccg ccccgcccca ggccctgatc gccgccatga ccgccctgga cgaggccatg 1080
gagcgcctcg cccgccgctc cgacgcctta agcctggagg tggccctcct ggaggcggga 1140
agggccctgg ccgccgaggc cctaccccag cccacgggcg ctccttcccc agaggtcggc 1200
cccaagccgg aaagcccccc gaccccggaa cccccaaggc ccgaggaggc gcccgacctg 1260
cgggagcggt ggcgggcctt cctcgaggcc ctcaggccca ccctacgggc cttcgtgcgg 1320
gaggcccgcc cggaggtccg ggaaggccag ctctgcctcg ctttccccga ggacaaggcc 1380
ttccactacc gcaaggcctc ggaacagaag gtgaggctcc tccccctggc ccaggcccat 1440
ttcggggtgg aggaggtcgt cctcgtcctg gagggagaaa aaaaaagcct gagcccaagg 1500
ccccgcccgg ccccacctcc tgaagcgccc gcacccccgg gccctcccga ggaggaggta 1560
gaggcggagg aagcggcgga ggaggccccg gaggaggcct tgaggcgggt ggtccgcctc 1620
ctgggggggc gggtgctctg ggtgcggcgg cccaggaccc gggaggcgcc ggaggaggaa 1680
cccctgagcc aagacgagat agggggtact ggtatataat gggggcatga cgcggaccac 1740
cgacctcgga caagagaccg tggacaacat cctcaagcgc ctccgccgta ttgagggcca 1800
ggtgcggggg ctccagaaga tggtggccga gggccgcccc tgcgacgagg tcctcaccca 1860
gatgaccgcc accaagaagg ccatggaggc ggcggccacc ctgatcctcc acgagttcct 1920
gaacgtctgc gccgccgagg tctccgaggg caaggtgaac cccaagaagc ccgaggagat 1980
cgccaccatg ctgaagaact tcatcta 2007

<210> 2
<211> 529
<212> PRT
<213> Thermus thermophilus

<400> 2
Met Ser Ala Leu Tyr Arg Arg Phe Arg Pro Leu Thr Phe Gln Glu Val
1 5 10 15

Val Gly Gln Glu His Val Lys Glu Pro Leu Leu Lys Ala Ile Arg Glu
20 25 30

Gly Arg Leu Ala Gln Ala Tyr Leu Phe Ser Gly Pro Arg Gly Val Gly
35 40 45

Lys Thr Thr Thr Ala Arg Leu Leu Ala Met Ala Val Gly Cys Gln Gly
50 55 60

Glu Asp Pro Pro Cys Gly Val Cys Pro His Cys Gln Ala Val Gln Arg
65 70 75 80

Gly Ala His Pro Asp Val Val Asp Ile Asp Ala Ala Ser Asn Asn Ser
85 90 95

Val Glu Asp Val Arg Glu Leu Arg Glu Arg Ile His Leu Ala Pro Leu
100 105 110

Ser Ala Pro Arg Lys Val Phe Ile Leu Asp Glu Ala His Met Leu Ser
115 120 125

Lys Ser Ala Phe Asn Ala Leu Leu Lys Thr Leu Glu Glu Pro Pro Pro
130 135 140

His Val Leu Phe Val Phe Ala Thr Thr Glu Pro Glu Arg Met Pro Pro
145 150 155 160

Thr Ile Leu Ser Arg Thr Gln His Phe Arg Phe Arg Arg Leu Thr Glu
165 170 175

Glu Glu Ile Ala Phe Lys Leu Arg Arg Ile Leu Glu Ala Val Gly Arg
180 185 190

Glu Ala Glu Glu Glu Ala Leu Leu Leu Leu Ala Arg Leu Ala Asp Gly
195 200 205

Ala Leu Arg Asp Ala Glu Ser Leu Leu Glu Arg Phe Leu Leu Leu Glu
210 215 220

Gly Pro Leu Thr Arg Lys Glu Val Glu Arg Ala Leu Gly Ser Pro Pro
225 230 235 240

Gly Thr Gly Val Ala Glu Ile Ala Ala Ser Leu Ala Arg Gly Lys Thr
245 250 255

Ala Glu Ala Leu Gly Leu Ala Arg Arg Leu Tyr Gly Glu Gly Tyr Ala
260 265 270

Pro Arg Ser Leu Val Ser Gly Leu Leu Glu Val Phe Arg Glu Gly Leu
275 280 285

Tyr Ala Ala Phe Gly Leu Ala Gly Thr Pro Leu Pro Ala Pro Pro Gln
290 295 300

Ala Leu Ile Ala Ala Met Thr Ala Leu Asp Glu Ala Met Glu Arg Leu
305 310 315 320

Ala Arg Arg Ser Asp Ala Leu Ser Leu Glu Val Ala Leu Leu Glu Ala
325 330 335

Gly Arg Ala Leu Ala Ala Glu Ala Leu Pro Gln Pro Thr Gly Ala Pro
340 345 350

```
Ser Pro Glu Val Gly Pro Lys Pro Glu Ser Pro Pro Thr Pro Glu Pro
        355                 360                 365

Pro Arg Pro Glu Glu Ala Pro Asp Leu Arg Glu Arg Trp Arg Ala Phe
    370                 375                 380

Leu Glu Ala Leu Arg Pro Thr Leu Arg Ala Phe Val Arg Glu Ala Arg
385                 390                 395                 400

Pro Glu Val Arg Glu Gly Gln Leu Cys Leu Ala Phe Pro Glu Asp Lys
                405                 410                 415

Ala Phe His Tyr Arg Lys Ala Ser Glu Gln Lys Val Arg Leu Leu Pro
            420                 425                 430

Leu Ala Gln Ala His Phe Gly Val Glu Glu Val Val Leu Val Leu Glu
        435                 440                 445

Gly Glu Lys Lys Ser Leu Ser Pro Arg Pro Arg Pro Ala Pro Pro Pro
    450                 455                 460

Glu Ala Pro Ala Pro Pro Gly Pro Pro Glu Glu Glu Val Glu Ala Glu
465                 470                 475                 480

Glu Ala Ala Glu Glu Ala Pro Glu Glu Ala Leu Arg Arg Val Val Arg
                485                 490                 495

Leu Leu Gly Gly Arg Val Leu Trp Val Arg Arg Pro Arg Thr Arg Glu
            500                 505                 510

Ala Pro Glu Glu Glu Pro Leu Ser Gln Asp Glu Ile Gly Gly Thr Gly
        515                 520                 525

Ile
```

<210> 3
<211> 1590
<212> DNA
<213> Thermus thermophilus

<400> 3
gtgagcgccc tctaccgccg cttccgcccc ctcaccttcc aggaggtggt ggggcaggag 60
cacgtgaagg agcccctcct caaggccatc cgggagggga ggctcgccca ggcctacctc 120
ttctccgggc ccaggggcgt gggcaagacc accacggcga ggctcctcgc catggcggtg 180
gggtgccagg gggaagaccc cccttgcggg gtctgccccc actgccaggc ggtgcagagg 240

```
ggcgcccacc cggacgtggt ggacattgac gccgccagca acaactccgt ggaggacgtg 300
cgggagctga gggaaaggat ccacctcgcc cccctctctg cccccaggaa ggtcttcatc 360
ctggacgagg cccacatgct ctccaaaagc gccttcaacg ccctcctcaa gaccctggag 420
gagcccccgc cccacgtcct cttcgtcttc gccaccaccg agcccgagag gatgcccccc 480
accatcctct cccgcaccca gcacttccgc ttccgccgcc tcacggagga ggagatcgcc 540
tttaagctcc ggcgcatcct ggaggccgtg gggcgggagg cggaggagga ggccctcctc 600
ctcctcgccc gcctggcgga cggggccctt agggacgcgg aaagcctcct ggagcgcttc 660
ctcctcctgg aaggcccccc cacccggaag gaggtggagc gcgccctagg ctcccccccа 720
gggaccgggg tggccgagat cgccgcctcc ctcgcgaggg ggaaaacggc ggaggccctg 780
ggcctcgccc ggcgcctcta cggggaaggg tacgccccga ggagcctggt ctcgggcctt 840
ttggaggtgt tccgggaagg cctctacgcc gccttcggcc tcgcgggaac ccccttccc 900
gccccgcccc aggccctgat cgccgccatg accgccctgg acgaggccat ggagcgcctc 960
gcccgccgct ccgacgcctt aagcctggag gtggccctcc tggaggcggg aagggccctg 1020
gccgccgagg ccctacccca gcccacgggc gctccttccc cagaggtcgg ccccaagccg 1080
gaaagccccc cgaccccgga acccccaagg cccgaggagg cgcccgacct gcgggagcgg 1140
tggcgggcct tcctcgaggc cctcaggccc accctacggg ccttcgtgcg ggaggcccgc 1200
ccggaggtcc gggaaggcca gctctgcctc gctttccccg aggacaaggc cttccactac 1260
cgcaaggcct cggaacagaa ggtgaggctc ctccccctgg cccaggccca tttcggggtg 1320
gaggaggtcg tcctcgtcct ggagggagaa aaaaaaagcc tgagcccaag gccccgcccg 1380
gccccacctc ctgaagcgcc cgcacccccg ggccctcccg aggaggaggt agaggcggag 1440
gaagcggcgg aggaggcccc ggaggaggcc ttgaggcggg tggtccgcct cctgggggggg 1500
cgggtgctct gggtgcggcg gcccaggacc cgggaggcgc cggaggagga acccctgagc 1560
caagacgaga taggggggtac tggtatataa                                  1590
```

<210> 4
<211> 464
<212> PRT
<213> Thermus thermophilus

<400> 4

```
Met Ser Ala Leu Tyr Arg Arg Phe Arg Pro Leu Thr Phe Gln Glu Val
  1               5                  10                  15

Val Gly Gln Glu His Val Lys Glu Pro Leu Leu Lys Ala Ile Arg Glu
             20                  25                  30

Gly Arg Leu Ala Gln Ala Tyr Leu Phe Ser Gly Pro Arg Gly Val Gly
         35                  40                  45

Lys Thr Thr Thr Ala Arg Leu Leu Ala Met Ala Val Gly Cys Gln Gly
     50                  55                  60

Glu Asp Pro Pro Cys Gly Val Cys Pro His Cys Gln Ala Val Gln Arg
 65                  70                  75                  80

Gly Ala His Pro Asp Val Val Asp Ile Asp Ala Ala Ser Asn Asn Ser
                 85                  90                  95
```

```
Val Glu Asp Val Arg Glu Leu Arg Glu Arg Ile His Leu Ala Pro Leu
            100                 105                 110

Ser Ala Pro Arg Lys Val Phe Ile Leu Asp Glu Ala His Met Leu Ser
        115                 120                 125

Lys Ser Ala Phe Asn Ala Leu Leu Lys Thr Leu Glu Glu Pro Pro Pro
    130                 135                 140

His Val Leu Phe Val Phe Ala Thr Thr Glu Pro Glu Arg Met Pro Pro
145                 150                 155                 160

Thr Ile Leu Ser Arg Thr Gln His Phe Arg Phe Arg Arg Leu Thr Glu
                165                 170                 175

Glu Glu Ile Ala Phe Lys Leu Arg Arg Ile Leu Glu Ala Val Gly Arg
            180                 185                 190

Glu Ala Glu Glu Glu Ala Leu Leu Leu Leu Ala Arg Leu Ala Asp Gly
        195                 200                 205

Ala Leu Arg Asp Ala Glu Ser Leu Leu Glu Arg Phe Leu Leu Leu Glu
    210                 215                 220

Gly Pro Leu Thr Arg Lys Glu Val Glu Arg Ala Leu Gly Ser Pro Pro
225                 230                 235                 240

Gly Thr Gly Val Ala Glu Ile Ala Ala Ser Leu Ala Arg Gly Lys Thr
                245                 250                 255

Ala Glu Ala Leu Gly Leu Ala Arg Arg Leu Tyr Gly Glu Gly Tyr Ala
            260                 265                 270

Pro Arg Ser Leu Val Ser Gly Leu Leu Glu Val Phe Arg Glu Gly Leu
        275                 280                 285

Tyr Ala Ala Phe Gly Leu Ala Gly Thr Pro Leu Pro Ala Pro Pro Gln
    290                 295                 300

Ala Leu Ile Ala Ala Met Thr Ala Leu Asp Glu Ala Met Glu Arg Leu
305                 310                 315                 320

Ala Arg Arg Ser Asp Ala Leu Ser Leu Glu Val Ala Leu Leu Glu Ala
                325                 330                 335

Gly Arg Ala Leu Ala Ala Glu Ala Leu Pro Gln Pro Thr Gly Ala Pro
            340                 345                 350
```

```
Ser Pro Glu Val Gly Pro Lys Pro Glu Ser Pro Pro Thr Pro Glu Pro
        355                 360                 365

Pro Arg Pro Glu Glu Ala Pro Asp Leu Arg Glu Arg Trp Arg Ala Phe
    370                 375                 380

Leu Glu Ala Leu Arg Pro Thr Leu Arg Ala Phe Val Arg Glu Ala Arg
385                 390                 395                 400

Pro Glu Val Arg Glu Gly Gln Leu Cys Leu Ala Phe Pro Glu Asp Lys
                405                 410                 415

Ala Phe His Tyr Arg Lys Ala Ser Glu Gln Lys Val Arg Leu Leu Pro
            420                 425                 430

Leu Ala Gln Ala His Phe Gly Val Glu Glu Val Val Leu Val Leu Glu
        435                 440                 445

Gly Glu Lys Lys Lys Pro Glu Pro Lys Ala Pro Pro Gly Pro Thr Ser
    450                 455                 460
```

<210> 5
<211> 454
<212> PRT
<213> Thermus thermophilus

<400> 5

```
Met Ser Ala Leu Tyr Arg Arg Phe Arg Pro Leu Thr Phe Gln Glu Val
  1               5                  10                  15

Val Gly Gln Glu His Val Lys Glu Pro Leu Leu Lys Ala Ile Arg Glu
            20                  25                  30

Gly Arg Leu Ala Gln Ala Tyr Leu Phe Ser Gly Pro Arg Gly Val Gly
        35                  40                  45

Lys Thr Thr Thr Ala Arg Leu Leu Ala Met Ala Val Gly Cys Gln Gly
    50                  55                  60

Glu Asp Pro Pro Cys Gly Val Cys Pro His Cys Gln Ala Val Gln Arg
65                  70                  75                  80

Gly Ala His Pro Asp Val Val Asp Ile Asp Ala Ala Ser Asn Asn Ser
```

85 90 95

Val Glu Asp Val Arg Glu Leu Arg Glu Arg Ile His Leu Ala Pro Leu
100 105 110

Ser Ala Pro Arg Lys Val Phe Ile Leu Asp Glu Ala His Met Leu Ser
115 120 125

Lys Ser Ala Phe Asn Ala Leu Leu Lys Thr Leu Glu Glu Pro Pro Pro
130 135 140

His Val Leu Phe Val Phe Ala Thr Thr Glu Pro Glu Arg Met Pro Pro
145 150 155 160

Thr Ile Leu Ser Arg Thr Gln His Phe Arg Phe Arg Arg Leu Thr Glu
165 170 175

Glu Glu Ile Ala Phe Lys Leu Arg Arg Ile Leu Glu Ala Val Gly Arg
180 185 190

Glu Ala Glu Glu Glu Ala Leu Leu Leu Leu Ala Arg Leu Ala Asp Gly
195 200 205

Ala Leu Arg Asp Ala Glu Ser Leu Leu Glu Arg Phe Leu Leu Leu Glu
210 215 220

Gly Pro Leu Thr Arg Lys Glu Val Glu Arg Ala Leu Gly Ser Pro Pro
225 230 235 240

Gly Thr Gly Val Ala Glu Ile Ala Ala Ser Leu Ala Arg Gly Lys Thr
245 250 255

Ala Glu Ala Leu Gly Leu Ala Arg Arg Leu Tyr Gly Glu Gly Tyr Ala
260 265 270

Pro Arg Ser Leu Val Ser Gly Leu Leu Glu Val Phe Arg Glu Gly Leu
275 280 285

Tyr Ala Ala Phe Gly Leu Ala Gly Thr Pro Leu Pro Ala Pro Pro Gln
290 295 300

Ala Leu Ile Ala Ala Met Thr Ala Leu Asp Glu Ala Met Glu Arg Leu
305 310 315 320

Ala Arg Arg Ser Asp Ala Leu Ser Leu Glu Val Ala Leu Leu Glu Ala
325 330 335

Gly Arg Ala Leu Ala Ala Glu Ala Leu Pro Gln Pro Thr Gly Ala Pro

340 345 350

Ser Pro Glu Val Gly Pro Lys Pro Glu Ser Pro Pro Thr Pro Glu Pro
355 360 365

Pro Arg Pro Glu Glu Ala Pro Asp Leu Arg Glu Arg Trp Arg Ala Phe
370 375 380

Leu Glu Ala Leu Arg Pro Thr Leu Arg Ala Phe Val Arg Glu Ala Arg
385 390 395 400

Pro Glu Val Arg Glu Gly Gln Leu Cys Leu Ala Phe Pro Glu Asp Lys
405 410 415

Ala Phe His Tyr Arg Lys Ala Ser Glu Gln Lys Val Arg Leu Leu Pro
420 425 430

Leu Ala Gln Ala His Phe Gly Val Glu Glu Val Val Leu Val Leu Glu
435 440 445

Gly Glu Lys Lys Lys Ala
450

<210> 6
<211> 32
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: primer

<400> 6
cgcaagcttc acgcstacct sttctccggs ac 32

<210> 7
<211> 8
<212> PRT
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: peptide

<400> 7
His Ala Tyr Leu Phe Ser Gly Thr
1 5

<210> 8
<211> 34
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: primer

<400> 8
cgcgaattcg tgctcsggsg gctcctcsag sgtc 34

<210> 9
<211> 9
<212> PRT
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: peptide

<400> 9
Lys Thr Leu Glu Glu Pro Pro Glu His
1 5

<210> 10
<211> 38
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: primer

<400> 10
gcgcggatcc ggagggagaa aaaaaaagcc tcagccca 38

<210> 11
<211> 38
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: primer

<400> 11
gcgcggatcc ggagggagag aagaaaagcc tcagccca 38

<210> 12
<211> 28
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: primer

<400> 12
gaattaaatt cgcgcttcgg gaggtggg 28

<210> 13
<211> 27
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: primer

<400> 13
gcgcgaattc gcgcttcggg aggtggg 27

<210> 14
<211> 29
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: primer

<400> 14
gcgcgaattc gggcgcttca ggaggtggg 29

<210> 15
<211> 31
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: primer

<400> 15
gtggtgcata tggtgagcgc cctctaccgc c 31

<210> 16
<211> 31
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: primer

<400> 16
gtggtggtcg acccaggagg gccacctcca g 31

<210> 17
<211> 8
<212> PRT
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: peptide

<220>
<221> PEPTIDE
<222> (2)
<223> X is any aa at position 2

<220>
<221> PEPTIDE
<222> (3)
<223> X is any aa at position 3

<220>
<221> PEPTIDE
<222> (5)
<223> X is any aa at position 5

<400> 17
Gly Xaa Xaa Gly Xaa Gly Lys Thr
1 5

<210> 18
<211> 12
<212> PRT
<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: peptide

<400> 18
Lys Pro Asp Pro Lys Ala Pro Pro Gly Pro Thr Ser
1 5 10

<210> 19
<211> 180
<212> PRT
<213> Escherichia coli

<400> 19
Met Ser Tyr Gln Val Leu Ala Arg Lys Trp Arg Pro Gln Thr Phe Ala
1 5 10 15

Asp Val Val Gly Gln Glu His Val Leu Thr Ala Leu Ala Asn Gly Leu
20 25 30

Ser Leu Gly Arg Ile His His Ala Tyr Leu Phe Ser Gly Thr Arg Gly
35 40 45

Val Gly Lys Thr Ser Ile Ala Arg Leu Leu Ala Lys Gly Leu Asn Cys
50 55 60

Glu Thr Gly Ile Thr Ala Thr Pro Cys Gly Val Cys Asp Asn Cys Arg
65 70 75 80

Glu Ile Glu Gln Gly Arg Phe Val Asp Leu Ile Glu Ile Asp Ala Ala
85 90 95

Ser Arg Thr Lys Val Glu Asp Thr Arg Asp Leu Leu Asp Asn Val Gln
100 105 110

Tyr Ala Pro Ala Arg Gly Arg Phe Lys Val Tyr Leu Ile Asp Glu Val
115 120 125

His Met Leu Ser Arg His Ser Phe Asn Ala Leu Leu Lys Thr Leu Glu
130 135 140

Glu Pro Pro Glu His Val Lys Phe Leu Leu Ala Thr Thr Asp Pro Gln
145 150 155 160

Lys Leu Pro Val Thr Ile Leu Ser Arg Cys Leu Gln Phe His Leu Lys
165 170 175

Ala Leu Asp Val
180

<210> 20
<211> 180
<212> PRT
<213> Bacillus subtilis

<400> 20
Met Ser Tyr Gln Ala Leu Tyr Arg Val Phe Arg Pro Gln Arg Phe Glu
1 5 10 15

Asp Val Val Gly Gln Glu His Ile Thr Lys Thr Leu Gln Asn Ala Leu
20 25 30

Leu Gln Lys Lys Phe Ser His Ala Tyr Leu Phe Ser Gly Pro Arg Gly
35 40 45

Thr Gly Lys Thr Ser Ala Ala Lys Ile Phe Ala Lys Ala Val Asn Cys
50 55 60

Glu His Ala Pro Val Asp Glu Pro Cys Asn Glu Cys Ala Ala Cys Lys
65 70 75 80

Gly Ile Thr Asn Gly Ser Ile Ser Asp Val Ile Glu Ile Asp Ala Ala
85 90 95

Ser Asn Asn Gly Val Asp Glu Ile Arg Asp Ile Arg Asp Lys Val Lys
100 105 110

Phe Ala Pro Ser Ala Val Thr Tyr Lys Val Tyr Ile Ile Asp Glu Val
115 120 125

His Met Leu Ser Ile Gly Ala Phe Asn Ala Leu Leu Lys Thr Leu Glu
130 135 140

Glu Pro Pro Glu His Cys Ile Phe Ile Leu Ala Thr Thr Glu Pro His
145 150 155 160

Lys Ile Pro Leu Thr Ile Ile Ser Arg Cys Gln Arg Phe Asp Phe Lys
165 170 175

Arg Ile Thr Ser
180

<210> 21
<211> 294
<212> PRT

<213> Escherichia coli

<400> 21

```
Met Ser Tyr Gln Val Leu Ala Arg Lys Trp Arg Pro Gln Thr Phe Ala
 1               5                  10                  15

Asp Val Val Gly Gln Glu His Val Leu Thr Ala Leu Ala Asn Gly Leu
            20                  25                  30

Ser Leu Gly Arg Ile His His Ala Tyr Leu Phe Ser Gly Thr Arg Gly
        35                  40                  45

Val Gly Lys Thr Ser Ile Ala Arg Leu Leu Ala Lys Gly Leu Asn Cys
    50                  55                  60

Glu Thr Gly Ile Thr Ala Thr Pro Cys Gly Val Cys Asp Asn Cys Arg
65                  70                  75                  80

Glu Ile Glu Gln Gly Arg Phe Val Asp Leu Ile Glu Ile Asp Ala Ala
                85                  90                  95

Ser Arg Thr Lys Val Glu Asp Thr Arg Asp Leu Leu Asp Asn Val Gln
            100                 105                 110

Tyr Ala Pro Ala Arg Gly Arg Phe Lys Val Tyr Leu Ile Asp Glu Val
        115                 120                 125

His Met Leu Ser Arg His Ser Phe Asn Ala Leu Leu Lys Thr Leu Glu
    130                 135                 140

Glu Pro Pro Glu His Val Lys Phe Leu Leu Ala Thr Thr Asp Pro Gln
145                 150                 155                 160

Lys Leu Pro Val Thr Ile Leu Ser Arg Cys Leu Gln Phe His Leu Lys
                165                 170                 175

Ala Leu Asp Val Glu Gln Ile Arg His Gln Leu Glu His Ile Leu Asn
            180                 185                 190

Glu Glu His Ile Ala His Glu Pro Arg Ala Leu Gln Leu Leu Ala Arg
        195                 200                 205

Ala Ala Glu Gly Ser Leu Arg Asp Ala Leu Ser Leu Thr Asp Gln Ala
    210                 215                 220

Ile Ala Ser Gly Asp Gly Gln Val Ser Thr Gln Ala Val Ser Ala Met
225                 230                 235                 240
```

```
Leu Gly Thr Leu Asp Asp Asp Gln Ala Leu Ser Leu Val Glu Ala Met
                245                 250                 255

Val Glu Ala Asn Gly Glu Arg Val Met Ala Leu Ile Asn Glu Ala Ala
            260                 265                 270

Ala Arg Gly Ile Glu Trp Glu Ala Leu Leu Val Glu Met Leu Gly Leu
        275                 280                 285

Leu His Arg Ile Ala Met
    290
```

<210> 22
<211> 294
<212> PRT
<213> Haemophilus influenzae

<400> 22

```
Met Ser Tyr Gln Val Leu Ala Arg Lys Trp Arg Pro Lys Thr Phe Ala
  1               5                  10                  15

Asp Val Val Gly Gln Glu His Ile Ile Thr Ala Leu Ala Asn Gly Leu
             20                  25                  30

Lys Asp Asn Arg Leu His His Ala Tyr Leu Phe Ser Gly Thr Arg Gly
         35                  40                  45

Val Gly Lys Thr Ser Ile Ala Arg Leu Phe Ala Lys Gly Leu Asn Cys
     50                  55                  60

Val His Gly Val Thr Ala Thr Pro Cys Gly Glu Cys Glu Asn Cys Lys
 65                  70                  75                  80

Ala Ile Glu Gln Gly Asn Phe Ile Asp Leu Ile Glu Ile Asp Ala Ala
                 85                  90                  95

Ser Arg Thr Lys Val Glu Asp Thr Arg Glu Leu Leu Asp Asn Val Gln
            100                 105                 110

Tyr Lys Pro Val Val Gly Arg Phe Lys Val Tyr Leu Ile Asp Glu Val
        115                 120                 125

His Met Leu Ser Arg His Ser Phe Asn Ala Leu Leu Lys Thr Leu Glu
    130                 135                 140

Glu Pro Pro Glu Tyr Val Lys Phe Leu Leu Ala Thr Thr Asp Pro Gln
145                 150                 155                 160
```

```
Lys Leu Pro Val Thr Ile Leu Ser Arg Cys Leu Gln Phe His Leu Lys
                165                 170                 175

Ala Leu Asp Glu Thr Gln Ile Ser Gln His Leu Ala His Ile Leu Thr
            180                 185                 190

Gln Glu Asn Ile Pro Phe Glu Asp Pro Ala Leu Val Lys Leu Ala Lys
        195                 200                 205

Ala Ala Gln Gly Ser Ile Arg Asp Ser Leu Ser Leu Thr Asp Gln Ala
    210                 215                 220

Ile Ala Met Gly Asp Arg Gln Val Thr Asn Asn Val Val Ser Asn Met
225                 230                 235                 240

Leu Gly Leu Leu Asp Asp Asn Tyr Ser Val Asp Ile Leu Tyr Ala Leu
                245                 250                 255

His Gln Gly Asn Gly Glu Leu Leu Met Arg Thr Leu Gln Arg Val Ala
            260                 265                 270

Asp Ala Ala Gly Asp Trp Asp Lys Leu Leu Gly Glu Cys Ala Glu Lys
        275                 280                 285

Leu His Gln Ile Ala Leu
    290
```

<210> 23
<211> 294
<212> PRT
<213> Bacillus subtilis

<400> 23

```
Met Ser Tyr Gln Ala Leu Tyr Arg Val Phe Arg Pro Gln Arg Phe Glu
  1               5                  10                  15

Asp Val Val Gly Gln Glu His Ile Thr Lys Thr Leu Gln Asn Ala Leu
             20                  25                  30

Leu Gln Lys Lys Phe Ser His Ala Tyr Leu Phe Ser Gly Pro Arg Gly
         35                  40                  45

Thr Gly Lys Thr Ser Ala Ala Lys Ile Phe Ala Lys Ala Val Asn Cys
     50                  55                  60

Glu His Ala Pro Val Asp Glu Pro Cys Asn Glu Cys Ala Ala Cys Lys
```

65 70 75 80

Gly Ile Thr Asn Gly Ser Ile Ser Asp Val Ile Glu Ile Asp Ala Ala
85 90 95

Ser Asn Asn Gly Val Asp Glu Ile Arg Asp Ile Arg Asp Lys Val Lys
100 105 110

Phe Ala Pro Ser Ala Val Thr Tyr Lys Val Tyr Ile Ile Asp Glu Val
115 120 125

His Met Leu Ser Ile Gly Ala Phe Asn Ala Leu Leu Lys Thr Leu Glu
130 135 140

Glu Pro Pro Glu His Cys Ile Phe Ile Leu Ala Thr Thr Glu Pro His
145 150 155 160

Lys Ile Pro Leu Thr Ile Ile Ser Arg Cys Gln Arg Phe Asp Phe Lys
165 170 175

Arg Ile Thr Ser Gln Ala Ile Val Gly Arg Met Asn Lys Ile Val Asp
180 185 190

Ala Glu Gln Leu Gln Val Glu Glu Gly Ser Leu Glu Ile Ile Ala Ser
195 200 205

Ala Ala His Gly Gly Met Arg Asp Ala Leu Ser Leu Leu Asp Gln Ala
210 215 220

Ile Ser Phe Ser Gly Asp Ile Leu Lys Val Glu Asp Ala Leu Leu Ile
225 230 235 240

Thr Gly Ala Val Ser Gln Leu Tyr Ile Gly Lys Leu Ala Lys Ser Leu
245 250 255

His Asp Lys Asn Val Ser Asp Ala Leu Glu Thr Leu Asn Glu Leu Leu
260 265 270

Gln Gln Gly Lys Asp Pro Ala Lys Leu Ile Glu Asp Met Ile Phe Tyr
275 280 285

Phe Arg Asp Met Leu Leu
290

<210> 24
<211> 300
<212> PRT

<213> Caulobacter crescentus

<400> 24

```
Asp Ala Tyr Thr Val Leu Ala Arg Lys Tyr Arg Pro Arg Thr Phe Glu
  1               5                  10                  15

Asp Leu Ile Gly Gln Glu Ala Met Val Arg Thr Leu Ala Asn Ala Phe
             20                  25                  30

Ser Thr Gly Arg Ile Ala His Ala Phe Met Leu Thr Gly Val Arg Gly
         35                  40                  45

Val Gly Lys Thr Thr Thr Ala Arg Leu Leu Ala Arg Ala Leu Asn Tyr
     50                  55                  60

Glu Thr Asp Thr Val Lys Gly Pro Ser Val Asp Leu Thr Thr Glu Gly
 65                  70                  75                  80

Tyr His Cys Arg Ser Ile Ile Glu Gly Arg His Met Asp Val Leu Glu
                 85                  90                  95

Leu Asp Ala Ala Ser Arg Thr Lys Val Asp Glu Met Arg Glu Leu Leu
            100                 105                 110

Asp Gly Val Arg Tyr Ala Pro Val Glu Ala Arg Tyr Lys Val Tyr Ile
        115                 120                 125

Ile Asp Glu Val His Met Leu Ser Thr Ala Ala Phe Asn Ala Leu Leu
    130                 135                 140

Lys Thr Leu Glu Glu Pro Pro Pro His Ala Lys Phe Ile Phe Ala Thr
145                 150                 155                 160

Thr Glu Ile Arg Lys Val Pro Val Thr Ile Leu Ser Arg Cys Gln Arg
                165                 170                 175

Phe Asp Leu Arg Arg Val Glu Pro Asp Val Leu Val Lys His Phe Asp
            180                 185                 190

Arg Ile Ser Ala Lys Glu Gly Ala Arg Ile Glu Met Asp Ala Leu Ala
        195                 200                 205

Leu Ile Ala Arg Ala Ala Glu Gly Ser Val Arg Asp Gly Leu Ser Leu
    210                 215                 220

Leu Asp Gln Ala Ile Val Gln Thr Glu Arg Gly Gln Thr Val Thr Ser
225                 230                 235                 240
```

Thr Val Val Arg Asp Met Leu Gly Leu Ala Asp Arg Ser Gln Thr Ile
245 250 255

Ala Leu Tyr Glu His Val Met Ala Gly Lys Thr Lys Asp Ala Leu Glu
260 265 270

Gly Phe Arg Ala Leu Trp Gly Phe Gly Ala Asp Pro Ala Val Val Met
275 280 285

Leu Asp Val Leu Asp His Cys His Ala Ser Ala Val
290 295 300

<210> 25
<211> 260
<212> PRT
<213> Mycoplasma genitalium

<400> 25
Met His Gln Val Phe Tyr Gln Lys Tyr Arg Pro Ile Asn Phe Lys Gln
1 5 10 15

Thr Leu Gly Gln Glu Ser Ile Arg Lys Ile Leu Val Asn Ala Ile Asn
20 25 30

Arg Asp Lys Leu Pro Asn Gly Tyr Ile Phe Ser Gly Glu Arg Gly Thr
35 40 45

Gly Lys Thr Thr Phe Ala Lys Ile Ile Ala Lys Ala Ile Asn Cys Leu
50 55 60

Asn Trp Asp Gln Ile Asp Val Cys Asn Ser Cys Asp Val Cys Lys Ser
65 70 75 80

Ile Asn Thr Asn Ser Ala Ile Asp Ile Val Glu Ile Asp Ala Ala Ser
85 90 95

Lys Asn Gly Ile Asn Asp Ile Arg Glu Leu Val Glu Asn Val Phe Asn
100 105 110

His Pro Phe Thr Phe Lys Lys Lys Val Tyr Ile Leu Asp Glu Ala His
115 120 125

Met Leu Thr Thr Gln Ser Trp Gly Gly Leu Leu Lys Thr Leu Glu Glu
130 135 140

Ser Pro Pro Tyr Val Leu Phe Ile Phe Thr Thr Thr Glu Phe Asn Lys
145 150 155 160

```
Ile Pro Leu Thr Ile Leu Ser Arg Cys Gln Ser Phe Phe Phe Lys Lys
                165                 170                 175

Ile Thr Ser Asp Leu Ile Leu Glu Arg Leu Asn Asp Ile Ala Lys Lys
            180                 185                 190

Glu Lys Ile Lys Ile Glu Lys Asp Ala Leu Ile Lys Ile Ala Asp Leu
        195                 200                 205

Ser Gln Gly Ser Leu Arg Asp Gly Leu Ser Leu Leu Asp Gln Leu Ala
    210                 215                 220

Ile Ser Leu Ile Val Lys Lys Leu Val Leu Leu Met Leu Lys Lys His
225                 230                 235                 240

Leu Ile Ser Leu Ile Glu Met Gln Asn Leu Leu Leu Leu Lys Gln Phe
                245                 250                 255

Tyr Gln Glu Ile
            260
```

<210> 26
<211> 289
<212> PRT
<213> Thermus thermophilus

<400> 26

```
Val Ser Ala Leu Tyr Arg Arg Phe Arg Pro Leu Thr Phe Gln Glu Val
  1               5                  10                  15

Val Gly Gln Glu His Val Lys Glu Pro Leu Leu Lys Ala Ile Arg Glu
            20                  25                  30

Gly Arg Leu Ala Gln Ala Tyr Leu Phe Ser Gly Pro Arg Gly Val Gly
        35                  40                  45

Lys Thr Thr Thr Ala Arg Leu Leu Ala Met Ala Val Gly Cys Gln Gly
    50                  55                  60

Glu Asp Pro Pro Cys Gly Val Cys Pro His Cys Gln Ala Val Gln Arg
65                  70                  75                  80

Gly Ala His Pro Asp Val Val Asp Ile Asp Ala Ala Ser Asn Asn Ser
                85                  90                  95

Val Glu Asp Val Arg Glu Leu Arg Glu Arg Ile His Leu Ala Pro Leu
```

```
            100                 105                 110

Ser Ala Pro Arg Lys Val Phe Ile Leu Asp Glu Ala His Met Leu Ser
        115                 120                 125

Lys Ser Ala Phe Asn Ala Leu Leu Lys Thr Leu Glu Glu Pro Pro Pro
    130                 135                 140

His Val Leu Phe Val Phe Ala Thr Thr Glu Pro Glu Arg Met Pro Pro
145                 150                 155                 160

Thr Ile Leu Ser Arg Thr Gln His Phe Arg Phe Arg Arg Leu Thr Glu
                165                 170                 175

Glu Glu Ile Ala Phe Lys Leu Arg Arg Ile Leu Glu Ala Val Gly Arg
            180                 185                 190

Glu Ala Glu Glu Glu Ala Leu Leu Leu Leu Ala Arg Leu Ala Asp Gly
        195                 200                 205

Ala Leu Arg Asp Ala Glu Ser Leu Leu Glu Arg Phe Leu Leu Leu Glu
    210                 215                 220

Gly Pro Leu Thr Arg Lys Glu Val Glu Arg Ala Leu Gly Ser Pro Pro
225                 230                 235                 240

Gly Thr Gly Val Ala Glu Ile Ala Ala Ser Leu Ala Arg Gly Lys Thr
                245                 250                 255

Ala Glu Ala Leu Gly Leu Ala Arg Arg Leu Tyr Gly Glu Gly Tyr Ala
            260                 265                 270

Pro Arg Ser Leu Val Ser Gly Leu Leu Glu Val Phe Arg Glu Gly Leu
        275                 280                 285

Tyr
```

<210> 27
<211> 94
<212> DNA
<213> Thermus thermophilus

<400> 27
gccggaggga gaaaaaaaaa gccgagccca aggccccgcc cggccccacc ccgaagcgcc 60
cgcacccccg ggcccccccga ggaggaggag aggc 94

<210> 28
<211> 11
<212> PRT
<213> Thermus thermophilus

<400> 28
Val Leu Glu Gly Glu Lys Lys Ser Leu Ser Pro
1 5 10

<210> 29
<211> 23
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: primer

<220>
<221> unsure
<222> (6)
<223> N at position 6 is either G or C

<220>
<221> unsure
<222> (12)
<223> N at position 12 is either G or C

<220>
<221> unsure
<222> (21)
<223> N at position 21 is either G or C

<400> 29
cacgcntacc tnttctccgg nac 23

<210> 30
<211> 25
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: primer

<220>
<221> unsure

<222> (7)
<223> N at position 7 is either G or C

<220>
<221> unsure
<222> (10)
<223> N at position 10 is either G or C

<220>
<221> unsure
<222> (19)
<223> N at position 19 is either G or C

<220>
<221> unsure
<222> (22)
<223> N at position 22 is either G or C

<400> 30
gtgctcnggn ggctcctcnt cngtc 25

<210> 31
<211> 33
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: primer

<400> 31
gtgggatccg tggttctgga tctcgatgaa gaa 33

<210> 32
<211> 29
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: primer

<400> 32
gtgggatcca cggsctstcs gagcagaag 29

<210> 33
<211> 34

<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: primer

<400> 33
gcgggatcct caacgaggac ctctccatct tcaa 34

<210> 34
<211> 35
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: primer

<400> 34
gcgggatcct tgtcgtcsag sgtsagsgcg tcgta 35

<210> 35
<211> 39
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: primer

<400> 35
gggaaggacc agcgcgtact ccccctgctc ctaggtgtg 39

<210> 36
<211> 27
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: primer

<400> 36
gtgtggatcc ttcttcttsc ccatsgc 27

<210> 37
<211> 27

<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: primer

<400> 37
caccgattcc agtggtgcct aggtgtg 27

<210> 38
<211> 30
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: primer

<400> 38
caacacctgg tgttccagga gcctgtgctt 30

<210> 39
<211> 23
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: primer

<400> 39
ccagaatcgt ctgctggtcg tag 23

<210> 40
<211> 19
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: primer

<400> 40
agcaccctgg aggagcttc 19

<210> 41
<211> 19

<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: primer

<400> 41
catgtcgtac tgggtgtac 19

<210> 42
<211> 27
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: primer

<220>
<221> unsure
<222> (7)
<223> N at position 7 is A, C, G, or T

<220>
<221> unsure
<222> (8)
<223> N at position 8 is A, C, G, or T

<220>
<221> unsure
<222> (13)
<223> N at position 13 is A, C, G, or T

<220>
<221> unsure
<222> (14)
<223> N at position 14 is A, C, G, or T

<400> 42
gtsgtsnnsg acnnsgagac sacsggg 27

<210> 43
<211> 27
<212> DNA
<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: primer

<220>
<221> unsure
<222> (8)
<223> N at position 8 is A, C, G, or T

<220>
<221> unsure
<222> (9)
<223> N at position 9 is A, C, G, or T

<220>
<221> unsure
<222> (17)
<223> N at position 17 is A, C, G, or T

<220>
<221> unsure
<222> (18)
<223> N at position 18 is A, C, G, or T

<400> 43
gaasccsnng tcgaasnngg cgttgtg 27

<210> 44
<211> 27
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: primer

<400> 44
cggggatcca cctcaatcac ctcgtgg 27

<210> 45
<211> 30
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: primer

<400> 45
cggggatccg ccaccttgcg gctccgggtg 30

<210> 46
<211> 31
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: primer

<400> 46
gcgctctaga cgagttccca aagcgtgcgg t 31

<210> 47
<211> 25
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: primer

<400> 47
cgcgtctaga tcacctgtat ccaga 25

<210> 48
<211> 33
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: primer

<400> 48
gcggcgcata tggtggtggt cctggacctg gag 33

<210> 49
<211> 25
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: primer

<400> 49
cgcgtctaga tcacctgtat ccaga 25

<210> 50
<211> 20
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: primer

<400> 50
gtsctsgtsa agacscactt 20

<210> 51
<211> 21
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: primer

<400> 51
sagsagsgcg ttgaasgtgt g 21

<210> 52
<211> 22
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: primer

<400> 52
ctcgttggtg aaagtttccg tg 22

<210> 53
<211> 22
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: primer

<400> 53
ctcgttggtg aaagtttccg tg 22

<210> 54
<211> 27
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: primer

<400> 54
tctggcaaca cgttctggag cacatcc 27

<210> 55
<211> 23
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: primer

<400> 55
tgctggcgtt catcttcagg atg 23

<210> 56
<211> 23
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: primer

<400> 56
catcctgaag atgaacgcca gca 23

<210> 57
<211> 25
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: primer

<400> 57
aggttatcca caggggtcat gtgca 25

<210> 58
<211> 29
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: primer

<400> 58
gtgtgtcata tgaacataac ggttcccaa 29

<210> 59
<211> 29
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: primer

<400> 59
gcgcgaattc tcccttgtgg aaggcttag 29

<210> 60
<211> 13
<212> PRT
<213> Thermus thermophilus

<400> 60
Arg Val Glu Leu Asp Tyr Asp Ala Leu Thr Leu Asp Asp
1 5 10

<210> 61
<211> 14
<212> PRT
<213> Thermus thermophilus

<400> 61
Phe Phe Ile Glu Ile Gln Asn His Gly Leu Ser Glu Gln Lys
1 5 10

<210> 62
<211> 8

<212> PRT
<213> Thermus thermophilus

<400> 62
Phe Phe Ile Glu Ile Gln Asn His
1 5

<210> 63
<211> 8
<212> PRT
<213> Thermus thermophilus

<400> 63
Tyr Asp Ala Leu Thr Leu Asp Asp
1 5

<210> 64
<211> 6
<212> PRT
<213> Thermus thermophilus

<400> 64
Ala Met Gly Lys Lys Lys
1 5

<210> 65
<211> 9
<212> PRT
<213> Thermus thermophilus

<400> 65
Phe Asn Lys Ser His Ser Ala Ala Tyr
1 5

<210> 66
<211> 9
<212> PRT
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: peptide

<220>
<221> PEPTIDE

<222> (3)
<223> Xaa at position 3 is undefined

<220>
<221> PEPTIDE
<222> (5)
<223> Xaa at position 5 is undefined

<400> 66
Val Val Xaa Asp Xaa Glu Thr Thr Gly
1 5

<210> 67
<211> 9
<212> PRT
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: peptide

<220>
<221> PEPTIDE
<222> (4)
<223> Xaa at position 4 is undefined

<220>
<221> PEPTIDE
<222> (7)
<223> Xaa at position 7 is undefined

<400> 67
His Asn Ala Xaa Phe Asp Xaa Gly Phe
1 5

<210> 68
<211> 9
<212> PRT
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: peptide

<220>
<221> PEPTIDE
<222> (3)
<223> Xaa at position 3 is undefined

<220>
<221> PEPTIDE
<222> (5)
<223> Xaa at position 5 is undefined

<400> 68
Val Val Xaa Asp Xaa Glu Thr Thr Gly
1 5

<210> 69
<211> 7
<212> PRT
<213> Thermus thermophilus

<400> 69
Val Leu Val Lys Thr His Leu
1 5

<210> 70
<211> 6
<212> PRT
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: peptide

<400> 70
His Arg Ala Leu Tyr Asp
1 5

<210> 71
<211> 7
<212> PRT
<213> Thermus thermophilus

<400> 71
His Thr Phe Asn Ala Leu Leu
1 5

<210> 72
<211> 34
<212> PRT
<213> Escherichia coli

<400> 72
Asp Arg Tyr Phe Leu Glu Leu Ile Arg Thr Gly Arg Pro Asp Glu Glu
1 5 10 15

Ser Tyr Leu His Ala Ala Val Glu Leu Ala Glu Ala Arg Gly Leu Pro
20 25 30

Val Val

<210> 73
<211> 34
<212> PRT
<213> Vibrio cholerae

<400> 73
Asp His Phe Tyr Leu Glu Leu Ile Arg Thr Gly Arg Ala Asp Glu Glu
1 5 10 15

Ser Tyr Leu His Phe Ala Leu Asp Val Ala Glu Gln Tyr Asp Leu Pro
20 25 30

Val Val

<210> 74
<211> 34
<212> PRT
<213> Haemophilus influenzae

<400> 74
Asp His Phe Tyr Leu Ala Leu Ser Arg Thr Gly Arg Pro Asn Glu Glu
1 5 10 15

Arg Tyr Ile Gln Ala Ala Leu Lys Leu Ala Glu Arg Cys Asp Leu Pro
20 25 30

Leu Val

<210> 75
<211> 34
<212> PRT
<213> Rickettsia prowazekii

<400> 75
Asp Arg Phe Tyr Phe Glu Ile Met Arg His Asp Leu Pro Glu Glu Gln
1 5 10 15

Phe Ile Glu Asn Ser Tyr Ile Gln Ile Ala Ser Glu Leu Ser Ile Pro
20 25 30

Ile Val

<210> 76
<211> 34
<212> PRT
<213> Helicobacter pylori

<400> 76
Asp Asp Phe Tyr Leu Glu Ile Met Arg His Gly Ile Leu Asp Gln Arg
1 5 10 15

Phe Ile Asp Glu Gln Val Ile Lys Met Ser Leu Glu Thr Gly Leu Lys
20 25 30

Ile Ile

<210> 77
<211> 34
<212> PRT
<213> Synechocystis sp.

<400> 77
Asp Asp Tyr Tyr Leu Glu Ile Gln Asp His Gly Ser Val Glu Asp Arg
1 5 10 15

Leu Val Asn Ile Asn Leu Val Lys Ile Ala Gln Glu Leu Asp Ile Lys
20 25 30

Ile Val

<210> 78
<211> 34
<212> PRT
<213> Mycobacterium tuberculosis

<400> 78
Asp Asn Tyr Phe Leu Glu Leu Met Asp His Gly Leu Thr Ile Glu Arg
1 5 10 15

Arg Val Arg Asp Gly Leu Leu Glu Ile Gly Arg Ala Leu Asn Ile Pro
20 25 30

Pro Leu

<210> 79
<211> 46
<212> PRT
<213> Escherichia coli

<400> 79
Asn Lys Arg Arg Ala Lys Asn Gly Glu Pro Pro Leu Asp Ile Ala Ala
1 5 10 15

Ile Pro Leu Asp Asp Lys Lys Ser Phe Asp Met Leu Gln Arg Ser Glu
20 25 30

Thr Thr Ala Val Phe Gln Leu Glu Ser Arg Gly Met Lys Asp
35 40 45

<210> 80
<211> 46
<212> PRT
<213> Vibrio cholerae

<400> 80
Asn Pro Arg Leu Lys Lys Ala Gly Lys Pro Pro Val Arg Ile Glu Ala
1 5 10 15

Ile Pro Leu Asp Asp Ala Arg Ser Phe Arg Asn Leu Gln Asp Ala Lys
20 25 30

Thr Thr Ala Val Phe Gln Leu Glu Ser Arg Gly Met Lys Glu
35 40 45

<210> 81
<211> 46
<212> PRT
<213> Haemophilus influenzae

<400> 81
Asn Val Arg Met Val Arg Glu Gly Lys Pro Arg Val Asp Ile Ala Ala
1 5 10 15

Ile Pro Leu Asp Asp Pro Glu Ser Phe Glu Leu Leu Lys Arg Ser Glu
20 25 30

Thr Thr Ala Val Phe Gln Leu Glu Ser Arg Gly Met Lys Asp
35 40 45

<210> 82
<211> 46
<212> PRT
<213> Rickettsia prowazekii

<400> 82
Cys Lys Lys Leu Leu Lys Glu Gln Gly Ile Lys Ile Asp Phe Asp Asp
1 5 10 15

Met Thr Phe Asp Asp Lys Lys Thr Tyr Gln Met Leu Cys Lys Gly Lys
20 25 30

Gly Val Gly Val Phe Gln Phe Glu Ser Ile Gly Met Lys Asp
35 40 45

<210> 83
<211> 45
<212> PRT
<213> Helicobacter pylori

<400> 83
Leu Lys Ile Ile Lys Thr Gln His Lys Ile Ser Val Asp Phe Leu Ser
1 5 10 15

Leu Asp Met Asp Asp Pro Lys Val Tyr Lys Thr Ile Gln Ser Gly Asp
20 25 30

Thr Val Gly Ile Phe Gln Ile Glu Ser Gly Met Phe Gln
35 40 45

<210> 84
<211> 46
<212> PRT
<213> Synechocystis sp.

<400> 84
Gln Glu Arg Lys Ala Leu Gln Ile Arg Ala Arg Thr Gly Ser Lys Lys
1 5 10 15

Leu Pro Asp Asp Val Lys Lys Thr His Lys Leu Leu Glu Ala Gly Asp
20 25 30

Leu Glu Gly Ile Phe Gln Leu Glu Ser Gln Gly Met Lys Gln
35 40 45

<210> 85
<211> 46
<212> PRT
<213> Mycobacterium tuberculosis

<400> 85
Ile Asp Asn Val Arg Ala Asn Arg Gly Ile Asp Leu Asp Leu Glu Ser
1 5 10 15

Val Pro Leu Asp Asp Lys Ala Thr Tyr Glu Leu Leu Gly Arg Gly Asp
20 25 30

Thr Leu Gly Val Phe Gln Leu Asp Gly Gly Pro Met Arg Asp
35 40 45

<210> 86
<211> 3729
<212> DNA
<213> Thermus thermophilus

<400> 86
atgggccggg agctccgctt cgcccacctc caccagcaca cccagttctc cctcctggac 60
ggggcggcga agctttccga cctcctcaag tgggtcaagg agacgacccc cgaggacccc 120
gccttggcca tgaccgacca cggcaacctc ttcggggccg tggagttcta caagaaggcc 180
accgaaatgg gcatcaagcc catcctgggc tacgaggcct acgtggcggc ggaaagccgc 240
tttgaccgca agcggggaaa gggcctagac gggggctact ttcacctcac cctcctcgcc 300
aaggacttca cggggtacca gaacctggtg cgcctggcga gccgggctta cctggagggg 360
ttttacgaaa agccccggat tgaccgggag atcctgcgcg agcacgccga gggcctcatc 420
gccctctcgg ggtgcctcgg ggcggagatc ccccagttca tcctccagga ccgtctggac 480
ctggccgagg cccggctcaa cgagtacctc tccatcttca aggaccgctt cttcatcgag 540
atccagaacc acggcctccc cgagcagaaa aaggtcaacg aggtcctcaa ggagttcgcc 600
cgaaagtacg gcctggggat ggtggccacc aacgacggcc attacgtgag gaaggaggac 660
gcccgcgccc acgaggtcct cctcgccatc cagtccaaga gcaccctgga cgaccccggg 720
cgctggcgct tcccctgcga cgagttctac gtgaagaccc ccgaggagat gcgggccatg 780
ttccccgagg aggagtgggg ggacgagccc tttgacaaca ccgtggagat cgcccgcatg 840

tgcaacgtgg agctgcccat cggggacaag atggtctacc gaatcccccg cttccccctc 900
cccgaggggc ggaccgaggc ccagtacctc atggagctca ccttcaaggg gctcctccgc 960
cgctacccgg accggatcac cgagggcttc taccgggagg tcttccgcct tttggggaag 1020
cttccccccc acggggacgg ggaggccttg gccgaggcct tggcccaggt ggagcgggag 1080
gcttgggaga ggctcatgaa gagcctcccc cctttggccg gggtcaagga gtggacggcg 1140
gaggccattt tccaccgggc cctttacgag ctttccgtga tagagcgcat ggggtttccc 1200
ggctacttcc tcatcgtcca ggactacatc aactgggccc ggagaaacgg cgtctccgtg 1260
gggcccggca gggggagcgc cgccgggagc ctggtggcct acgccgtggg gatcaccaac 1320
attgaccccc tccgcttcgg cctcctcttt gagcgcttcc tgaacccgga gagggtctcc 1380
atgcccgaca ttgacacgga cttctccgac cgggagcggg accgggtgat ccagtacgtg 1440
cgggagcgct acggcgagga caaggtggcc cagatcggca ccctgggaag cctcgcctcc 1500
aaggccgccc tcaaggacgt ggcccgggtc tacggcatcc cccacaagaa ggcggaggaa 1560
ttggccaagc tcatcccggt gcagttcggg aagcccaagc ccctgcagga ggccatccag 1620
gtggtgccgg agcttagggc ggagatggag aaggacccca aggtgcggga ggtcctcgag 1680
gtggccatgc gcctggaggg cctgaaccgc cacgcctccg tccacgccgc cggggtggtg 1740
atcgccgccg agcccctcac ggacctcgtc cccctcatgc gcgaccagga agggcggccc 1800
gtcacccagt acgacatggg ggcggtggag gccttggggc ttttgaagat ggacttttg 1860
ggcctccgca ccctcacctt cctggacgag gtcaagcgca tcgtcaaggc gtcccagggg 1920
gtggagctgg actacgatgc cctccccctg gacgacccca agaccttcgc cctcctctcc 1980
cgggggggaga ccaaggggt cttccagctg gagtcggggg ggatgaccgc cacgctccgc 2040
ggcctcaagc cgcggcgctt tgaggacctg atcgccatcc tctccctcta ccgccccggg 2100
cccatggagc acatccccac ctacatccgc cgccaccacg ggctggagcc cgtgagctac 2160
agcgagtttc cccacgccga gaagtaccta aagcccatcc tggacgagac ctacggcatc 2220
cccgtctacc aggagcagat catgcagatc gcctcggccg tggcggggta ctccctgggc 2280
gaggcggacc tcctgcggcg gtccatgggc aagaagaagg tggaggagat gaagtcccac 2340
cgggagcgct tcgtccaggg ggccaaggaa aggggcgtgc ccgaggagga ggccaaccgc 2400
ctctttgaca tgctggaggc cttcgccaac tacggcttca acaaatccca cgctgccgcc 2460
tacagcctcc tctcctacca gaccgcctac gtgaaggccc actaccccgt ggagttcatg 2520
gccgccctcc tctccgtgga gcggcacgac tccgacaagg tggccgagta catccgcgac 2580
gcccgggcca tgggcataga ggtccttccc ccggacgtca accgctccgg gtttgacttc 2640
ctggtccagg gccggcagat ccttttcggc ctctccgcgg tgaagaacgt gggcgaggcg 2700
gcggcggagg ccattctccg ggagcgggag cggggcggcc cctaccggag cctcggcgac 2760
ttcctcaagc ggctggacga gaaggtgctc aacaagcgga ccctggagtc cctcatcaag 2820
gcgggcgccc tggacggctt cggggaaagg gcgcggctcc tcgcctccct ggaagggctc 2880
ctcaagtggg cggccgagaa ccgggagaag gcccgctcgg gcatgatggg cctcttcagc 2940
gaagtggagg agccgccttt ggccgaggcc gccccctgg acgagatcac ccggctccgc 3000
tacgagaagg aggccctggg gatctacgtc tccggccacc ccatcttgcg gtaccccggg 3060
ctccgggaga cggccacctg caccctggag gagcttcccc acctggcccg ggacctgccg 3120
ccccggtcta gggtcctcct tgccgggatg gtggaggagg tggtgcgcaa gcccacaaag 3180
agcggcggga tgatggcccg cttcgtcctc tccgacgaga cgggggcgct tgaggcggtg 3240
gcattcggcc gggcctacga ccaggtctcc ccgaggctca aggaggacac ccccgtgctc 3300
gtcctcgccg aggtggagcg ggaggagggg ggcgtgcggg tgctggccca ggccgtttgg 3360
acctacgagg agctggagca ggtcccccgg gccctcgagg tggaggtgga ggcctccctc 3420
ctggacgacc ggggggtggc ccacctgaaa agcctcctgg acgagcacgc ggggaccctc 3480
cccctgtacg tccgggtcca gggcgccttc ggcgaggccc tcctcgccct gagggaggtg 3540
cgggtggggg aggaggctgt aggcggccgc gtggttccgg gcctacctcc tgcccgaccg 3600
ggaggtcctt ctccagggcg gccaggcggg ggaggcccag gaggcggtgc ccttctaggg 3660
ggtgggccgt gagacctagc gccatcgttc tcgccggggg caaggaggcc tgggcccgac 3720

<210> 87
<211> 1245
<212> PRT
<213> Thermus thermophilus

<400> 87
Met Gly Arg Glu Leu Arg Phe Ala His Leu His Gln His Thr Gln Phe
1 5 10 15

Ser Leu Leu Asp Gly Ala Pro Lys Leu Ser Asp Leu Leu Lys Trp Val
20 25 30

Glu Glu Thr Thr Pro Glu Asp Pro Ala Leu Ala Met Thr Asp His Gly
35 40 45

Asn Leu Phe Gly Ala Val Glu Phe Tyr Lys Lys Ala Thr Glu Met Gly
50 55 60

Ile Lys Pro Ile Leu Gly Tyr Glu Ala Tyr Val Ala Ala Glu Ser Arg
65 70 75 80

Phe Asp Arg Lys Arg Gly Lys Gly Leu Asp Gly Gly Tyr Phe His Leu
85 90 95

Thr Leu Leu Ala Lys Asp Phe Thr Gly Tyr Gln Asn Leu Val Arg Leu
100 105 110

Ala Ser Arg Ala Tyr Leu Glu Gly Phe Tyr Glu Lys Pro Arg Ile Asp
115 120 125

Arg Glu Ile Leu Arg Glu His Ala Glu Gly Leu Ile Ala Leu Ser Gly
130 135 140

Cys Leu Gly Ala Glu Ile Pro Gln Phe Ile Leu Gln Asp Arg Leu Asp
145 150 155 160

Leu Ala Glu Ala Arg Leu Asn Glu Tyr Leu Ser Ile Phe Lys Asp Arg
165 170 175

Phe Phe Ile Glu Ile Gln Asn His Gly Leu Pro Glu Gln Lys Lys Val
180 185 190

Asn Glu Val Leu Lys Glu Phe Ala Arg Lys Tyr Gly Leu Gly Met Val
195 200 205

```
Ala Thr Asn Asp Gly His Tyr Val Arg Lys Glu Asp Ala Arg Ala His
    210                 215                 220

Glu Val Leu Leu Ala Ile Gln Ser Lys Ser Thr Leu Asp Asp Pro Gly
225                 230                 235                 240

Ala Leu Ala Leu Pro Cys Glu Glu Phe Tyr Val Lys Thr Pro Glu Glu
                245                 250                 255

Met Arg Ala Met Phe Pro Glu Glu Glu Val Gly Gly Arg Ser Pro Leu
            260                 265                 270

Thr Thr Pro Trp Arg Ser Pro His Val Gln Arg Gly Ala Ala Ile Gly
        275                 280                 285

Thr Arg Trp Ser Thr Arg Ile Pro Arg Phe Pro Leu Pro Glu Gly Arg
    290                 295                 300

Thr Glu Ala Gln Tyr Leu Met Glu Leu Thr Phe Lys Gly Leu Leu Arg
305                 310                 315                 320

Arg Tyr Pro Asp Arg Ile Thr Glu Gly Phe Tyr Arg Glu Val Phe Arg
                325                 330                 335

Leu Ser Gly Lys Leu Pro Pro His Gly Asp Gly Glu Ala Leu Ala Glu
            340                 345                 350

Ala Leu Ala Gln Val Glu Arg Glu Ala Trp Glu Arg Leu Met Lys Ser
        355                 360                 365

Leu Pro Pro Leu Ala Gly Val Lys Glu Trp Thr Ala Glu Ala Ile Phe
    370                 375                 380

His Arg Ala Leu Tyr Glu Leu Ser Ala Ile Glu Arg Met Gly Phe Pro
385                 390                 395                 400

Gly Leu Leu Pro His Arg Pro Gly Leu His Gln Leu Gly Pro Glu Lys
                405                 410                 415

Gly Val Ser Val Gly Pro Gly Arg Gly Gly Ala Ala Gly Ser Leu Val
            420                 425                 430

Ala Tyr Ala Val Gly Ile Thr Asn Ile Asp Pro Leu Arg Phe Gly Leu
        435                 440                 445

Leu Phe Glu Arg Phe Leu Asn Pro Glu Arg Val Ser Met Pro Asp Ile
    450                 455                 460
```

```
Asp Thr Asp Phe Ser Asp Arg Glu Arg Asp Arg Val Ile Gln Tyr Val
465                 470                 475                 480

Arg Glu Arg Tyr Gly Glu Asp Lys Val Ala Gln Ile Gly Thr Leu Gly
                485                 490                 495

Ser Leu Ala Ser Lys Ala Ala Leu Lys Glu Val Ala Arg Val Tyr Gly
            500                 505                 510

Ile Pro Arg Lys Lys Ala Glu Glu Leu Ala Lys Leu Ile Pro Val Gln
        515                 520                 525

Phe Gly Lys Pro Lys Pro Leu Gln Glu Ala Ile Gln Val Val Pro Glu
    530                 535                 540

Leu Arg Ala Glu Met Glu Lys Asp Pro Lys Val Arg Glu Val Leu Glu
545                 550                 555                 560

Val Ala Met Arg Leu Glu Gly Leu Asn Arg His Ala Ser Val His Ala
                565                 570                 575

Gly Arg Gly Gly Val Phe Ser Glu Pro Leu Thr Asp Leu Val Pro Leu
            580                 585                 590

Cys Ala Thr Arg Lys Gly Gly Pro Tyr Thr Gln Tyr Asp Met Gly Ala
        595                 600                 605

Val Glu Ala Leu Gly Leu Leu Lys Met Asp Phe Leu Gly Leu Arg Thr
    610                 615                 620

Leu Thr Phe Leu Asp Glu Val Lys Arg Ile Val Lys Ala Ser Gln Gly
625                 630                 635                 640

Val Glu Leu Asp Tyr Asp Ala Leu Pro Leu Asp Asp Pro Lys Thr Phe
                645                 650                 655

Ala Leu Leu Ser Arg Gly Glu Thr Lys Gly Val Phe Gln Leu Glu Ser
            660                 665                 670

Gly Gly Met Thr Ala Thr Leu Arg Gly Leu Lys Pro Arg Arg Phe Glu
        675                 680                 685

Asp Leu Ile Ala Ile Leu Ser Leu Tyr Arg Pro Gly Pro Met Glu His
    690                 695                 700

Ile Pro Thr Tyr Ile Arg Arg His His Gly Leu Glu Pro Val Ser Tyr
705                 710                 715                 720
```

```
Ser Glu Phe Pro His Ala Glu Lys Tyr Leu Lys Pro Ile Leu Asp Glu
                725                 730                 735

Thr Tyr Gly Ile Pro Val Tyr Gln Glu Gln Ile Met Gln Ile Ala Ser
            740                 745                 750

Ala Val Ala Gly Tyr Ser Leu Gly Glu Ala Asp Leu Leu Arg Arg Ser
        755                 760                 765

Met Gly Lys Lys Lys Val Glu Glu Met Lys Ser His Arg Glu Arg Phe
    770                 775                 780

Val Gln Gly Ala Lys Glu Arg Gly Val Pro Glu Glu Glu Ala Asn Arg
785                 790                 795                 800

Leu Phe Asp Met Leu Glu Ala Phe Ala Asn Tyr Gly Phe Asn Lys Ser
                805                 810                 815

His Ala Ala Ala Tyr Ser Leu Leu Ser Tyr Gln Thr Ala Tyr Val Lys
            820                 825                 830

Ala His Tyr Pro Val Glu Phe Met Ala Ala Leu Leu Ser Val Glu Arg
        835                 840                 845

His Asp Ser Asp Lys Val Ala Glu Tyr Ile Arg Asp Ala Arg Ala Met
    850                 855                 860

Gly Ile Glu Val Leu Pro Pro Asp Val Asn Arg Ser Gly Phe Asp Phe
865                 870                 875                 880

Leu Val Gln Gly Arg Gln Ile Leu Phe Gly Leu Ser Ala Val Lys Asn
                885                 890                 895

Val Gly Glu Ala Ala Ala Glu Ala Ile Leu Arg Glu Arg Glu Arg Gly
            900                 905                 910

Gly Pro Tyr Arg Ser Leu Gly Asp Phe Leu Lys Arg Leu Asp Glu Lys
        915                 920                 925

Val Leu Asn Lys Arg Thr Leu Glu Ser Leu Ile Lys Ala Gly Ala Leu
    930                 935                 940

Asp Gly Phe Gly Glu Arg Ala Arg Leu Leu Ala Ser Leu Glu Gly Leu
945                 950                 955                 960

Leu Lys Trp Ala Ala Glu Asn Arg Glu Lys Ala Arg Ser Gly Met Met
                965                 970                 975
```

```
Gly Leu Phe Ser Glu Val Glu Glu Pro Pro Leu Ala Glu Ala Ala Pro
            980                 985                 990

Leu Asp Glu Ile Thr Arg Leu Arg Tyr Glu Lys Glu Ala Leu Gly Ile
        995                1000                1005

Tyr Val Ser Gly His Pro Ile Leu Arg Tyr Pro Gly Leu Arg Glu Thr
   1010                1015                1020

Ala Thr Cys Thr Leu Glu Glu Leu Pro His Leu Ala Arg Asp Leu Pro
1025                1030                1035                1040

Pro Arg Ser Arg Val Leu Leu Ala Gly Met Val Glu Glu Val Val Arg
                1045                1050                1055

Lys Pro Thr Lys Ser Gly Gly Met Met Ala Arg Phe Val Leu Ser Asp
            1060                1065                1070

Glu Thr Gly Ala Leu Glu Ala Val Ala Phe Gly Arg Ala Tyr Asp Gln
       1075                1080                1085

Val Ser Pro Arg Leu Lys Glu Asp Thr Pro Val Leu Val Leu Ala Glu
   1090                1095                1100

Val Glu Arg Glu Glu Gly Gly Val Arg Val Leu Ala Gln Ala Val Trp
1105                1110                1115                1120

Thr Tyr Gln Glu Leu Glu Gln Val Pro Arg Ala Leu Glu Val Glu Val
                1125                1130                1135

Glu Ala Ser Leu Pro Asp Asp Arg Gly Val Ala His Leu Lys Ser Leu
            1140                1145                1150

Leu Asp Glu His Ala Gly Thr Leu Pro Leu Tyr Val Arg Val Gln Gly
       1155                1160                1165

Ala Phe Gly Glu Ala Leu Leu Ala Leu Arg Glu Val Arg Val Gly Glu
   1170                1175                1180

Glu Ala Leu Gly Ala Leu Glu Ala Ala Gly Phe Pro Ala Tyr Leu Leu
1185                1190                1195                1200

Pro Asn Arg Glu Val Ser Pro Arg Leu Thr Gly Ser Gly Gly Pro Arg
                1205                1210                1215

Gly Arg Ala Leu Ser Thr Gly Leu Ala Leu Lys Thr Tyr Pro Ile Ala
            1220                1225                1230
```

```
Leu Pro Gly Gly Asn Glu Ala Leu Ala Arg Pro Leu Leu
       1235                1240                1245


<210> 88
<211> 198
<212> PRT
<213> Thermus thermophilus

<400> 88
Val Glu Arg Val Val Arg Thr Leu Leu Asp Gly Arg Phe Leu Leu Glu
  1               5                  10                  15

Glu Gly Val Gly Leu Trp Glu Trp Arg Tyr Pro Phe Pro Leu Glu Gly
             20                  25                  30

Glu Ala Val Val Val Leu Asp Leu Glu Thr Thr Gly Leu Ala Gly Leu
         35                  40                  45

Asp Glu Val Ile Glu Val Gly Leu Leu Arg Leu Glu Gly Gly Arg Arg
     50                  55                  60

Leu Pro Phe Gln Ser Leu Val Arg Pro Leu Pro Pro Ala Glu Ala Arg
 65                  70                  75                  80

Ser Trp Asn Leu Thr Gly Ile Pro Arg Glu Ala Leu Glu Glu Ala Pro
                 85                  90                  95

Ser Leu Glu Glu Val Leu Glu Lys Ala Tyr Pro Leu Arg Gly Asp Ala
            100                 105                 110

Thr Leu Val Ile His Asn Ala Ala Phe Asp Leu Gly Phe Leu Arg Pro
        115                 120                 125

Ala Leu Glu Gly Leu Gly Tyr Arg Leu Glu Asn Pro Val Val Asp Ser
    130                 135                 140

Leu Arg Leu Ala Arg Arg Gly Leu Pro Gly Leu Arg Arg Tyr Gly Leu
145                 150                 155                 160

Asp Ala Leu Ser Glu Val Leu Glu Leu Pro Arg Arg Thr Cys His Arg
                165                 170                 175

Ala Leu Glu Asp Val Glu Arg Thr Leu Ala Val Val His Glu Val Tyr
            180                 185                 190

Tyr Met Leu Thr Ser Gly
        195
```

<210> 89
<211> 182
<212> PRT
<213> Deinococcus radiodurans

<220>
<221> PEPTIDE
<222> (79)
<223> X at position 79 is undefined

<400> 89
Pro Trp Pro Gln Asp Val Val Val Phe Asp Leu Glu Thr Thr Gly Phe
1 5 10 15

Ser Pro Ala Ser Ala Ala Ile Val Glu Ile Gly Ala Val Arg Ile Val
20 25 30

Gly Gly Gln Ile Asp Glu Thr Leu Lys Phe Glu Thr Leu Val Arg Pro
35 40 45

Thr Arg Pro Asp Gly Ser Met Leu Ser Ile Pro Trp Gln Ala Gln Arg
50 55 60

Val His Gly Ile Ser Asp Glu Met Val Arg Arg Ala Pro Ala Xaa Lys
65 70 75 80

Asp Val Leu Pro Asp Phe Phe Asp Phe Val Asp Gly Ser Ala Val Val
85 90 95

Ala His Asn Val Ser Phe Asp Gly Gly Phe Met Arg Ala Gly Ala Glu
100 105 110

Arg Leu Gly Leu Ser Trp Ala Pro Glu Arg Glu Leu Cys Thr Met Gln
115 120 125

Leu Ser Arg Arg Ala Phe Pro Arg Glu Arg Thr His Asn Leu Thr Val
130 135 140

Leu Ala Glu Arg Leu Gly Leu Glu Phe Ala Pro Gly Gly Arg His Arg
145 150 155 160

Ser Tyr Gly Asp Val Gln Val Thr Ala Gln Ala Tyr Leu Arg Leu Leu
165 170 175

Glu Leu Leu Gly Glu Arg
180

<210> 90
<211> 201
<212> PRT
<213> Bacillus subtilis

<400> 90
His Gly Ile Lys Met Ile Tyr Gly Met Glu Ala Asn Leu Val Asp Asp
1 5 10 15

Gly Val Pro Ile Ala Tyr Asn Ala Ala His Arg Leu Leu Glu Glu Glu
20 25 30

Thr Tyr Val Val Phe Asp Val Glu Thr Thr Gly Leu Ser Ala Val Tyr
35 40 45

Asp Thr Ile Ile Glu Leu Ala Ala Val Lys Val Lys Gly Gly Glu Ile
50 55 60

Ile Asp Lys Phe Glu Ala Phe Ala Asn Pro His Arg Pro Leu Ser Ala
65 70 75 80

Thr Ile Ile Glu Leu Thr Gly Ile Thr Asp Asp Met Leu Gln Asp Ala
85 90 95

Pro Asp Val Val Asp Val Ile Arg Asp Phe Arg Glu Trp Ile Gly Asp
100 105 110

Asp Ile Leu Val Ala His Asn Ala Ser Phe Asp Met Gly Phe Leu Asn
115 120 125

Val Ala Tyr Lys Lys Leu Leu Glu Val Glu Lys Ala Lys Asn Pro Val
130 135 140

Ile Asp Thr Leu Glu Leu Gly Arg Phe Leu Tyr Pro Glu Phe Lys Asn
145 150 155 160

His Arg Leu Asn Thr Leu Cys Lys Lys Phe Asp Ile Glu Leu Thr Gln
165 170 175

His His Arg Ala Ile Tyr Asp Thr Glu Ala Thr Ala Tyr Leu Leu Leu
180 185 190

Lys Met Leu Lys Asp Ala Ala Glu Lys
195 200

<210> 91
<211> 188
<212> PRT
<213> Haemophilus influenzae

<220>
<221> PEPTIDE
<222> (47)
<223> X at position 47 is undefined

<220>
<221> PEPTIDE
<222> (57)
<223> X at position 57 is undefined

<400> 91

```
Met Ile Asn Pro Asn Arg Gln Ile Val Leu Asp Thr Glu Thr Thr Gly
  1               5                  10                  15

Met Asn Gln Leu Gly Ala His Tyr Glu Gly His Cys Ile Ile Glu Ile
             20                  25                  30

Gly Ala Val Glu Leu Ile Asn Arg Arg Tyr Thr Gly Asn Asn Xaa His
         35                  40                  45

Ile Tyr Ile Lys Pro Asp Arg Pro Xaa Asp Pro Asp Ala Ile Lys Val
     50                  55                  60

His Gly Ile Thr Asp Glu Met Leu Ala Asp Lys Pro Glu Phe Lys Glu
 65                  70                  75                  80

Val Ala Gln Asp Phe Leu Asp Tyr Ile Asn Gly Ala Glu Leu Leu Ile
                 85                  90                  95

His Asn Ala Pro Phe Asp Val Gly Phe Met Asp Tyr Glu Phe Arg Lys
            100                 105                 110

Leu Asn Leu Asn Val Lys Thr Asp Asp Ile Cys Leu Val Thr Asp Thr
        115                 120                 125

Leu Gln Met Ala Arg Gln Met Tyr Pro Gly Lys Arg Asn Asn Leu Asp
    130                 135                 140

Ala Leu Cys Asp Arg Leu Gly Ile Asp Asn Ser Lys Arg Thr Leu His
145                 150                 155                 160

Gly Ala Leu Leu Asp Ala Glu Ile Leu Ala Asp Val Tyr Leu Met Met
                165                 170                 175
```

```
Thr Gly Gly Gln Thr Asn Leu Phe Asp Glu Glu Glu
            180                 185


<210> 92
<211> 189
<212> PRT
<213> Escherichia coli

<400> 92
Met Ser Thr Ala Ile Thr Arg Gln Ile Val Leu Asp Thr Glu Thr Thr
  1               5                  10                  15

Gly Met Asn Gln Ile Gly Ala His Ser Glu Gly His Lys Ile Ile Glu
             20                  25                  30

Ile Gly Ala Val Glu Val Val Asn Arg Arg Leu Thr Gly Asn Asn Phe
         35                  40                  45

His Val Tyr Leu Lys Asp Arg Leu Val Asp Pro Glu Ala Phe Gly Val
     50                  55                  60

His Gly Ile Ala Val Asp Phe Leu Leu Asp Lys Pro Thr Phe Ala Glu
 65                  70                  75                  80

Val Ala Val Glu Phe Met Asp Tyr Ile Arg Gly Ala Glu Leu Val Ile
                 85                  90                  95

His Asn Ala Ala Phe Asp Ile Gly Phe Met Asp Tyr Glu Phe Ser Leu
            100                 105                 110

Leu Lys Arg Asp Ile Ala Lys Thr Asn Thr Phe Cys Lys Val Thr Asp
        115                 120                 125

Ser Leu Ala Val Ala Arg Lys Met Phe Pro Gly Lys Arg Asn Ser Leu
    130                 135                 140

Asp Ala Leu Cys Ala Arg Tyr Glu Ile Asp Asn Ser Lys Arg Thr Leu
145                 150                 155                 160

His Gly Ala Leu Leu Asp Ala Gln Ile Leu Ala Glu Val Tyr Leu Ala
                165                 170                 175

Met Thr Gly Gly Gln Thr Ser Met Ala Phe Ala Met Glu
            180                 185
```

<210> 93
<211> 201
<212> PRT
<213> Helicobacter pylori

<400> 93
Asn Leu Glu Tyr Leu Lys Ala Cys Gly Leu Asn Phe Ile Glu Thr Ser
1 5 10 15

Glu Asn Leu Ile Thr Leu Lys Asn Leu Lys Thr Pro Leu Lys Asp Glu
20 25 30

Val Phe Ser Phe Ile Asp Leu Glu Thr Thr Gly Ser Cys Pro Ile Lys
35 40 45

His Glu Ile Leu Glu Ile Gly Ala Val Gln Val Lys Gly Gly Glu Ile
50 55 60

Ile Asn Arg Phe Glu Thr Leu Val Lys Val Lys Ser Val Pro Asp Tyr
65 70 75 80

Ile Ala Glu Leu Thr Gly Ile Thr Tyr Glu Asp Thr Leu Asn Ala Pro
85 90 95

Ser Ala His Glu Ala Leu Gln Glu Leu Arg Leu Phe Leu Gly Asn Ser
100 105 110

Val Phe Val Ala His Asn Ala Asn Phe Asp Tyr Asn Phe Leu Gly Arg
115 120 125

Tyr Phe Val Glu Lys Leu His Cys Pro Leu Leu Asn Leu Lys Leu Cys
130 135 140

Thr Leu Asp Leu Ser Lys Arg Ala Ile Leu Ser Met Arg Tyr Ser Leu
145 150 155 160

Ser Phe Leu Lys Glu Leu Leu Gly Phe Gly Ile Glu Val Ser His Arg
165 170 175

Ala Tyr Ala Asp Ala Leu Ala Ser Tyr Lys Leu Phe Glu Ile Cys Leu
180 185 190

Leu Asn Leu Pro Ser Tyr Ile Lys Thr
195 200

<210> 94
<211> 630

<212> DNA
<213> Thermus thermophilus

<400> 94
atggtggagc gggtggtgcg gacccttctg gacgggaggt tcctcctgga ggaggggtg 60
gggctttggg agtggcgcta ccccttccc ctggaggggg aggcggtggt ggtcctggac 120
ctggagacca cggggcttgc cggcctggac gaggtgattg aggtgggcct cctccgcctg 180
gaggggggga ggcgcctccc cttccagagc ctcgtccggc ccctcccgcc cgccgaagcc 240
cgttcgtgga acctcaccgg catcccccgg gaggccctgg aggaggcccc ctccctggag 300
gaggttctgg agaaggccta ccccctccgc ggcgacgcca ccttggtgat ccacaacgcc 360
gcctttgacc tgggcttcct ccgcccggcc ttggagggcc tgggctaccg cctggaaaac 420
cccgtggtgg actccctgcg cttggccaga cggggcttac caggccttag gcgctacggc 480
ctggacgccc tctccgaggt cctggagctt ccccgaagga cctgccaccg ggccctcgag 540
gacgtggagc gcaccctcgc cgtggtgcac gaggtatact atatgcttac gtccggccgt 600
ccccgcacgc tttgggaact cgggaggtag 630

<210> 95
<211> 210
<212> PRT
<213> Thermus thermophilus

<400> 95
Met Val Glu Arg Val Val Arg Thr Leu Leu Asp Gly Arg Phe Leu Leu
1 5 10 15

Glu Glu Gly Val Gly Leu Trp Glu Trp Arg Tyr Pro Phe Pro Leu Glu
20 25 30

Gly Glu Ala Val Val Val Leu Asp Leu Glu Thr Thr Gly Leu Ala Gly
35 40 45

Leu Asp Glu Val Ile Glu Val Gly Leu Leu Arg Leu Glu Gly Gly Arg
50 55 60

Arg Leu Pro Phe Gln Ser Leu Val Arg Pro Leu Pro Pro Ala Glu Ala
65 70 75 80

Arg Ser Trp Asn Leu Thr Gly Ile Pro Arg Glu Ala Leu Glu Glu Ala
85 90 95

Pro Ser Leu Glu Glu Val Leu Glu Lys Ala Tyr Pro Leu Arg Gly Asp
100 105 110

Ala Thr Leu Val Ile His Asn Ala Ala Phe Asp Leu Gly Phe Leu Arg
115 120 125

Pro Ala Leu Glu Gly Leu Gly Tyr Arg Leu Glu Asn Pro Val Val Asp

```
    130                 135                 140

Ser Leu Arg Leu Ala Arg Arg Gly Leu Pro Gly Leu Arg Arg Tyr Gly
145                 150                 155                 160

Leu Asp Ala Leu Ser Glu Val Leu Glu Leu Pro Arg Arg Thr Cys His
                165                 170                 175

Arg Ala Leu Glu Asp Val Glu Arg Thr Leu Ala Val Val His Glu Val
            180                 185                 190

Tyr Tyr Met Leu Thr Ser Gly Arg Pro Arg Thr Leu Trp Glu Leu Gly
        195                 200                 205

Arg Glx
    210
```

<210> 96
<211> 461
<212> PRT
<213> Pseudomonas marcesans

<400> 96

```
Met Leu Glu Ala Ser Trp Glu Lys Val Gln Ser Ser Leu Lys Gln Asn
  1               5                  10                  15

Leu Ser Lys Pro Ser Tyr Glu Thr Trp Ile Arg Pro Thr Glu Phe Ser
             20                  25                  30

Gly Phe Lys Asn Gly Glu Leu Thr Leu Ile Ala Pro Asn Ser Phe Ser
         35                  40                  45

Ser Ala Trp Leu Lys Asn Asn Tyr Ser Gln Thr Ile Gln Glu Thr Ala
     50                  55                  60

Glu Glu Ile Phe Gly Glu Pro Val Thr Val His Val Lys Val Lys Ala
 65                  70                  75                  80

Asn Ala Glu Ser Ser Asp Glu His Tyr Ser Ser Ala Pro Ile Thr Pro
                85                  90                  95

Pro Leu Glu Ala Ser Pro Gly Ser Val Asp Ser Ser Gly Ser Ser Leu
            100                 105                 110

Arg Leu Ser Lys Lys Thr Leu Pro Leu Leu Asn Leu Arg Tyr Val Phe
        115                 120                 125
```

```
Asn Arg Phe Val Val Gly Pro Asn Ser Arg Met Ala His Ala Ala Ala
    130                 135                 140

Met Ala Val Ala Glu Ser Pro Gly Arg Glu Phe Asn Pro Leu Phe Ile
145                 150                 155                 160

Cys Gly Gly Val Gly Leu Gly Lys Thr His Leu Met Gln Ala Ile Gly
                165                 170                 175

His Tyr Arg Leu Glu Ile Asp Pro Gly Ala Lys Val Ser Tyr Val Ser
            180                 185                 190

Thr Glu Thr Phe Thr Asn Asp Leu Ile Leu Ala Ile Arg Gln Asp Arg
        195                 200                 205

Met Gln Ala Phe Arg Asp Arg Tyr Arg Ala Ala Asp Leu Ile Leu Val
    210                 215                 220

Asp Asp Ile Gln Phe Ile Glu Gly Lys Glu Tyr Thr Gln Glu Glu Phe
225                 230                 235                 240

Phe His Thr Phe Asn Ala Leu His Asp Ala Gly Ser Gln Ile Val Leu
                245                 250                 255

Ala Ser Asp Arg Pro Pro Ser Gln Ile Pro Arg Leu Gln Glu Arg Leu
            260                 265                 270

Met Ser Arg Phe Ser Met Gly Leu Ile Ala Asp Val Gln Ala Pro Asp
        275                 280                 285

Leu Glu Thr Arg Met Ala Ile Leu Gln Lys Lys Ala Glu His Glu Arg
    290                 295                 300

Val Gly Leu Pro Arg Asp Leu Ile Gln Phe Ile Ala Gly Arg Phe Thr
305                 310                 315                 320

Ser Asn Ile Arg Glu Leu Glu Gly Ala Leu Thr Arg Ala Ile Ala Phe
                325                 330                 335

Ala Ser Ile Thr Gly Leu Pro Met Thr Val Asp Ser Ile Ala Pro Met
            340                 345                 350

Leu Asp Pro Asn Gly Gln Gly Val Glu Val Thr Pro Lys Gln Val Leu
        355                 360                 365

Asp Lys Val Ala Glu Val Phe Lys Val Thr Pro Asp Glu Met Arg Ser
    370                 375                 380
```

```
Ala Ser Arg Arg Arg Pro Val Ser Gln Ala Arg Gln Val Gly Met Tyr
385                 390                 395                 400

Leu Met Arg Gln Gly Thr Asn Leu Ser Leu Pro Arg Ile Gly Asp Thr
                405                 410                 415

Phe Gly Gly Lys Asp His Thr Thr Val Met Tyr Ala Ile Glu Gln Val
            420                 425                 430

Glu Lys Lys Leu Ser Ser Asp Pro Gln Ile Ala Ser Gln Val Gln Lys
        435                 440                 445

Ile Arg Asp Leu Leu Gln Ile Asp Ser Arg Arg Lys Arg
    450                 455                 460
```

<210> 97
<211> 447
<212> PRT
<213> Synechocystis sp.

<400> 97

```
Met Val Ser Cys Glu Asn Leu Trp Gln Gln Ala Leu Ala Ile Leu Ala
  1               5                  10                  15

Thr Gln Leu Thr Lys Pro Ala Phe Asp Thr Trp Ile Lys Ala Ser Val
             20                  25                  30

Leu Ile Ser Leu Gly Asp Gly Val Ala Thr Ile Gln Val Glu Asn Gly
         35                  40                  45

Phe Val Leu Asn His Leu Gln Lys Ser Tyr Gly Pro Leu Leu Met Glu
     50                  55                  60

Val Leu Thr Asp Leu Thr Gly Gln Glu Ile Thr Val Lys Leu Ile Thr
 65                  70                  75                  80

Asp Gly Leu Glu Pro His Ser Leu Ile Gly Gln Glu Ser Ser Leu Pro
                 85                  90                  95

Met Glu Thr Thr Pro Lys Asn Ala Thr Ala Leu Asn Gly Lys Tyr Thr
            100                 105                 110

Phe Ser Arg Phe Val Val Gly Pro Thr Asn Arg Met Ala His Ala Ala
        115                 120                 125

Ser Leu Ala Val Ala Glu Ser Pro Gly Arg Glu Phe Asn Pro Leu Phe
    130                 135                 140
```

```
Leu Cys Gly Gly Val Gly Leu Gly Lys Thr His Leu Met Gln Ala Ile
145                 150                 155                 160

Ala His Tyr Arg Leu Glu Met Tyr Pro Asn Ala Lys Val Tyr Tyr Val
                165                 170                 175

Ser Thr Glu Arg Phe Thr Asn Asp Leu Ile Thr Ala Ile Arg Gln Asp
            180                 185                 190

Asn Met Glu Asp Phe Arg Ser Tyr Tyr Arg Ser Ala Asp Phe Leu Leu
        195                 200                 205

Ile Asp Asp Ile Gln Phe Ile Lys Gly Lys Glu Tyr Thr Gln Glu Glu
    210                 215                 220

Phe Phe His Thr Phe Asn Ser Leu His Glu Ala Gly Lys Gln Val Val
225                 230                 235                 240

Val Ala Ser Asp Arg Ala Pro Gln Arg Ile Pro Gly Leu Gln Asp Arg
                245                 250                 255

Leu Ile Ser Arg Phe Ser Met Gly Leu Ile Ala Asp Ile Gln Val Pro
            260                 265                 270

Asp Leu Glu Thr Arg Met Ala Ile Leu Gln Lys Lys Ala Glu Tyr Asp
        275                 280                 285

Arg Ile Arg Leu Pro Lys Glu Val Ile Glu Tyr Ile Ala Ser His Tyr
    290                 295                 300

Thr Ser Asn Ile Arg Glu Leu Glu Gly Ala Leu Ile Arg Ala Ile Ala
305                 310                 315                 320

Tyr Thr Ser Leu Ser Asn Val Ala Met Thr Val Glu Asn Ile Ala Pro
                325                 330                 335

Val Leu Asn Pro Pro Val Glu Lys Val Ala Ala Ala Pro Glu Thr Ile
            340                 345                 350

Ile Thr Ile Val Ala Gln His Tyr Gln Leu Lys Val Glu Glu Leu Leu
        355                 360                 365

Ser Asn Ser Arg Arg Arg Glu Val Ser Leu Ala Arg Gln Val Gly Met
    370                 375                 380

Tyr Leu Met Arg Gln His Thr Asp Leu Ser Leu Pro Arg Ile Gly Glu
385                 390                 395                 400
```

```
Ala Phe Gly Gly Lys Asp His Thr Thr Val Met Tyr Ser Cys Asp Lys
                405                 410                 415

Ile Thr Gln Leu Gln Gln Lys Asp Trp Glu Thr Ser Gln Thr Leu Thr
            420                 425                 430

Ser Leu Ser His Arg Ile Asn Ile Ala Gly Gln Ala Pro Glu Ser
        435                 440                 445
```

<210> 98
<211> 446
<212> PRT
<213> Bacillus subtilis

<400> 98

```
Met Glu Asn Ile Leu Asp Leu Trp Asn Gln Ala Leu Ala Gln Ile Glu
  1               5                  10                  15

Lys Lys Leu Ser Lys Pro Ser Phe Glu Thr Trp Met Lys Ser Thr Lys
             20                  25                  30

Ala His Ser Leu Gln Gly Asp Thr Leu Thr Ile Thr Ala Pro Asn Glu
         35                  40                  45

Phe Ala Arg Asp Trp Leu Glu Ser Arg Tyr Leu His Leu Ile Ala Asp
     50                  55                  60

Thr Ile Tyr Glu Leu Thr Gly Glu Glu Leu Ser Ile Lys Phe Val Ile
 65                  70                  75                  80

Pro Gln Asn Gln Asp Val Glu Asp Phe Met Pro Lys Pro Gln Val Lys
                85                  90                  95

Lys Ala Val Lys Glu Asp Thr Ser Asp Phe Pro Gln Asn Met Leu Asn
            100                 105                 110

Pro Lys Tyr Thr Phe Asp Thr Phe Val Ile Gly Ser Gly Asn Arg Phe
        115                 120                 125

Ala His Ala Ala Ser Leu Ala Val Ala Glu Ala Pro Ala Lys Ala Tyr
    130                 135                 140

Asn Pro Leu Phe Ile Tyr Gly Gly Val Gly Leu Gly Lys Thr His Leu
145                 150                 155                 160

Met His Ala Ile Gly His Tyr Val Ile Asp His Asn Pro Ser Ala Lys
```

```
                165                 170                 175

Val Val Tyr Leu Ser Ser Glu Lys Phe Thr Asn Glu Phe Ile Asn Ser
            180                 185                 190

Ile Arg Asp Asn Lys Ala Val Asp Phe Arg Asn Arg Tyr Arg Asn Val
        195                 200                 205

Asp Val Leu Leu Ile Asp Asp Ile Gln Phe Leu Ala Gly Lys Glu Gln
    210                 215                 220

Thr Gln Glu Glu Phe Phe His Thr Phe Asn Thr Leu His Glu Glu Ser
225                 230                 235                 240

Lys Gln Ile Val Ile Ser Ser Asp Arg Pro Pro Lys Glu Ile Pro Thr
                245                 250                 255

Leu Glu Asp Arg Leu Arg Ser Arg Phe Glu Trp Gly Leu Ile Thr Asp
            260                 265                 270

Ile Thr Pro Pro Asp Leu Glu Thr Arg Ile Ala Ile Leu Arg Lys Lys
        275                 280                 285

Ala Lys Ala Glu Gly Leu Asp Ile Pro Asn Glu Val Met Leu Tyr Ile
    290                 295                 300

Ala Asn Gln Ile Asp Ser Asn Ile Arg Glu Leu Glu Gly Ala Leu Ile
305                 310                 315                 320

Arg Val Val Ala Tyr Ser Ser Leu Ile Asn Lys Asp Ile Asn Ala Asp
                325                 330                 335

Leu Ala Ala Glu Ala Leu Lys Asp Ile Ile Pro Ser Ser Lys Pro Lys
            340                 345                 350

Val Ile Thr Ile Lys Glu Ile Gln Arg Val Val Gly Gln Gln Phe Asn
        355                 360                 365

Ile Lys Leu Glu Asp Phe Lys Ala Lys Lys Arg Thr Lys Ser Val Ala
    370                 375                 380

Phe Pro Arg Gln Ile Ala Met Tyr Leu Ser Arg Glu Met Thr Asp Ser
385                 390                 395                 400

Ser Leu Pro Lys Ile Gly Glu Glu Phe Gly Gly Arg Asp His Thr Thr
                405                 410                 415

Val Ile His Ala His Glu Lys Ile Ser Lys Leu Leu Ala Asp Asp Glu
```

```
            420                 425                 430

Gln Leu Gln Gln His Val Lys Glu Ile Lys Glu Gln Leu Lys
        435                 440                 445
```

<210> 99
<211> 507
<212> PRT
<213> Mycobacterium tuberculosis

<400> 99

```
Met Thr Asp Asp Pro Gly Ser Gly Phe Thr Thr Val Trp Asn Ala Val
  1               5                  10                  15

Val Ser Glu Leu Asn Gly Asp Pro Lys Val Asp Asp Gly Pro Ser Ser
             20                  25                  30

Asp Ala Asn Leu Ser Ala Pro Leu Thr Pro Gln Gln Arg Ala Trp Leu
         35                  40                  45

Asn Leu Val Gln Pro Leu Thr Ile Val Glu Gly Phe Ala Leu Leu Ser
     50                  55                  60

Val Pro Ser Ser Phe Val Gln Asn Glu Ile Glu Arg His Leu Arg Ala
 65                  70                  75                  80

Pro Ile Thr Asp Ala Leu Ser Arg Arg Leu Gly His Gln Ile Gln Leu
                 85                  90                  95

Gly Val Arg Ile Ala Pro Pro Ala Thr Asp Glu Ala Asp Asp Thr Thr
            100                 105                 110

Val Pro Pro Ser Glu Asn Pro Ala Thr Thr Ser Pro Asp Thr Thr Thr
        115                 120                 125

Asp Asn Asp Glu Ile Asp Asp Ser Ala Ala Ala Arg Gly Asp Asn Gln
    130                 135                 140

His Ser Trp Pro Ser Tyr Phe Thr Glu Arg Pro His Asn Thr Asp Ser
145                 150                 155                 160

Ala Thr Ala Gly Val Thr Ser Leu Asn Arg Arg Tyr Thr Phe Asp Thr
                165                 170                 175

Phe Val Ile Gly Ala Ser Asn Arg Phe Ala His Ala Ala Ala Leu Ala
            180                 185                 190
```

```
Ile Ala Glu Ala Pro Ala Arg Ala Tyr Asn Pro Leu Phe Ile Trp Gly
        195                 200                 205

Glu Ser Gly Leu Gly Lys Thr His Leu Leu His Ala Ala Gly Asn Tyr
    210                 215                 220

Ala Gln Arg Leu Phe Pro Gly Met Arg Val Lys Tyr Val Ser Thr Glu
225                 230                 235                 240

Glu Phe Thr Asn Asp Phe Ile Asn Ser Leu Arg Asp Asp Arg Lys Val
                245                 250                 255

Ala Phe Lys Arg Ser Tyr Arg Asp Val Asp Val Leu Leu Val Asp Asp
            260                 265                 270

Ile Gln Phe Ile Glu Gly Lys Glu Gly Ile Gln Glu Glu Phe Phe His
        275                 280                 285

Thr Phe Asn Thr Leu His Asn Ala Asn Lys Gln Ile Val Ile Ser Ser
    290                 295                 300

Asp Arg Pro Pro Lys Gln Leu Ala Thr Leu Glu Asp Arg Leu Arg Thr
305                 310                 315                 320

Arg Phe Glu Trp Gly Leu Ile Thr Asp Val Gln Pro Pro Glu Leu Glu
                325                 330                 335

Thr Arg Ile Ala Ile Leu Arg Lys Lys Ala Gln Met Glu Arg Leu Ala
            340                 345                 350

Val Pro Asp Asp Val Leu Glu Leu Ile Ala Ser Ser Ile Glu Arg Asn
        355                 360                 365

Ile Arg Glu Leu Glu Gly Ala Leu Ile Arg Val Thr Ala Phe Ala Ser
    370                 375                 380

Leu Asn Lys Thr Pro Ile Asp Lys Ala Leu Ala Glu Ile Val Leu Arg
385                 390                 395                 400

Asp Leu Ile Ala Asp Ala Asn Thr Met Gln Ile Ser Ala Ala Thr Ile
                405                 410                 415

Met Ala Ala Thr Ala Glu Tyr Phe Asp Thr Thr Val Glu Glu Leu Arg
            420                 425                 430

Gly Pro Gly Lys Thr Arg Ala Leu Ala Gln Ser Arg Gln Ile Ala Met
        435                 440                 445
```

```
Tyr Leu Cys Arg Glu Leu Thr Asp Leu Ser Leu Pro Lys Ile Gly Gln
    450                 455                 460

Ala Phe Gly Arg Asp His Thr Thr Val Met Tyr Ala Gln Arg Lys Ile
465                 470                 475                 480

Leu Ser Glu Met Ala Glu Arg Arg Glu Val Phe Asp His Val Lys Glu
                485                 490                 495

Leu Thr Thr Arg Ile Arg Gln Arg Ser Lys Arg
            500                 505
```

<210> 100
<211> 446
<212> PRT
<213> Thermus thermophilus

<400> 100

```
Met Ser His Glu Ala Val Trp Gln His Val Leu Glu His Ile Arg Arg
  1               5                  10                  15

Ser Ile Thr Glu Val Glu Phe His Thr Trp Phe Glu Arg Ile Arg Pro
             20                  25                  30

Leu Gly Ile Arg Asp Gly Val Leu Glu Leu Ala Val Pro Thr Ser Phe
         35                  40                  45

Ala Leu Asp Trp Ile Arg Arg His Tyr Ala Gly Leu Ile Gln Glu Gly
     50                  55                  60

Pro Arg Leu Leu Gly Ala Gln Ala Pro Arg Phe Glu Leu Arg Val Val
 65                  70                  75                  80

Pro Gly Val Val Val Gln Glu Asp Ile Phe Gln Pro Pro Pro Ser Pro
                85                  90                  95

Pro Ala Gln Ala Gln Pro Glu Asp Thr Phe Lys Thr Ser Trp Trp Gly
            100                 105                 110

Pro Thr Thr Pro Trp Pro His Gly Gly Ala Val Ala Val Ala Glu Ser
        115                 120                 125

Pro Gly Arg Ala Tyr Asn Pro Leu Phe Ile Tyr Gly Gly Arg Gly Leu
    130                 135                 140

Gly Lys Thr Tyr Leu Met His Ala Val Gly Pro Leu Arg Ala Lys Arg
145                 150                 155                 160
```

```
Phe Pro His Met Arg Leu Glu Tyr Val Ser Thr Glu Thr Phe Thr Asn
                165                 170                 175

Glu Leu Ile Asn Arg Pro Ser Ala Arg Asp Arg Met Thr Glu Phe Arg
            180                 185                 190

Glu Arg Tyr Arg Ser Val Asp Leu Leu Leu Val Asp Asp Val Gln Phe
        195                 200                 205

Ile Ala Gly Lys Glu Arg Thr Gln Glu Glu Phe Phe His Thr Phe Asn
    210                 215                 220

Ala Leu Tyr Glu Ala His Lys Gln Ile Ile Leu Ser Ser Asp Arg Pro
225                 230                 235                 240

Pro Lys Asp Ile Leu Thr Leu Glu Ala Arg Leu Arg Ser Arg Phe Glu
                245                 250                 255

Trp Gly Leu Ile Thr Asp Asn Pro Ala Pro Asp Leu Glu Thr Arg Ile
            260                 265                 270

Ala Ile Leu Lys Met Asn Ala Ser Ser Gly Pro Glu Asp Pro Glu Asp
        275                 280                 285

Ala Leu Glu Tyr Ile Ala Arg Gln Val Thr Ser Asn Ile Arg Glu Trp
    290                 295                 300

Glu Gly Ala Leu Met Arg Ala Ser Pro Phe Ala Ser Leu Asn Gly Val
305                 310                 315                 320

Glu Leu Thr Arg Ala Val Ala Ala Lys Ala Leu Arg His Leu Arg Pro
                325                 330                 335

Arg Glu Leu Glu Ala Asp Pro Leu Glu Ile Ile Arg Lys Ala Ala Gly
            340                 345                 350

Pro Val Arg Pro Glu Thr Pro Gly Gly Ala His Gly Glu Arg Arg Lys
        355                 360                 365

Lys Glu Val Val Leu Pro Arg Gln Leu Ala Met Tyr Leu Val Arg Glu
    370                 375                 380

Leu Thr Pro Ala Ser Leu Pro Glu Ile Gly Gln Leu Phe Gly Gly Arg
385                 390                 395                 400

Asp His Thr Thr Val Arg Tyr Ala Ile Gln Lys Val Gln Glu Leu Ala
                405                 410                 415
```

```
Gly Lys Pro Asp Arg Glu Val Gln Gly Leu Leu Arg Thr Leu Arg Glu
            420                 425                 430

Ala Cys Thr Asp Pro Val Asp Asn Leu Trp Ile Thr Cys Gly
        435                 440                 445
```

<210> 101
<211> 467
<212> PRT
<213> Escherichia coli

<400> 101

```
Met Ser Leu Ser Leu Trp Gln Gln Cys Leu Ala Arg Leu Gln Asp Glu
  1               5                  10                  15

Leu Pro Ala Thr Glu Phe Ser Met Trp Ile Arg Pro Leu Gln Ala Glu
             20                  25                  30

Leu Ser Asp Asn Thr Leu Ala Leu Tyr Ala Pro Asn Arg Phe Val Leu
         35                  40                  45

Asp Trp Val Arg Asp Lys Tyr Leu Asn Asn Ile Asn Gly Leu Leu Thr
     50                  55                  60

Ser Phe Cys Gly Ala Asp Ala Pro Gln Leu Arg Phe Glu Val Gly Thr
 65                  70                  75                  80

Lys Pro Val Thr Gln Thr Pro Gln Ala Ala Val Thr Ser Asn Val Ala
                 85                  90                  95

Ala Pro Ala Gln Val Ala Gln Thr Gln Pro Gln Arg Ala Ala Pro Ser
            100                 105                 110

Thr Arg Ser Gly Trp Asp Asn Val Pro Ala Pro Ala Glu Pro Thr Tyr
        115                 120                 125

Arg Ser Asn Val Asn Val Lys His Thr Phe Asp Asn Phe Val Glu Gly
    130                 135                 140

Lys Ser Asn Gln Leu Ala Arg Ala Ala Ala Arg Gln Val Ala Asp Asn
145                 150                 155                 160

Pro Gly Gly Ala Tyr Asn Pro Leu Phe Leu Tyr Gly Gly Thr Gly Leu
                165                 170                 175

Gly Lys Thr His Leu Leu His Ala Val Gly Asn Gly Ile Met Ala Arg
```

```
            180                 185                 190

Lys Pro Asn Ala Lys Val Val Tyr Met His Ser Glu Arg Phe Val Gln
        195                 200                 205

Asp Met Val Lys Ala Leu Gln Asn Asn Ala Ile Glu Glu Phe Lys Arg
    210                 215                 220

Tyr Tyr Arg Ser Val Asp Ala Leu Leu Ile Asp Asp Ile Gln Phe Phe
225                 230                 235                 240

Ala Asn Lys Glu Arg Ser Gln Glu Glu Phe Phe His Thr Phe Asn Ala
                245                 250                 255

Leu Leu Glu Gly Asn Gln Gln Ile Ile Leu Thr Ser Asp Arg Tyr Pro
            260                 265                 270

Lys Glu Ile Asn Gly Val Glu Asp Arg Leu Lys Ser Arg Phe Gly Trp
        275                 280                 285

Gly Leu Thr Val Ala Ile Glu Pro Pro Glu Leu Glu Thr Arg Val Ala
    290                 295                 300

Ile Leu Met Lys Lys Ala Asp Glu Asn Asp Ile Arg Leu Pro Gly Glu
305                 310                 315                 320

Val Ala Phe Phe Ile Ala Lys Arg Leu Arg Ser Asn Val Arg Glu Leu
                325                 330                 335

Glu Gly Ala Leu Asn Arg Val Ile Ala Asn Ala Asn Phe Thr Gly Arg
            340                 345                 350

Ala Ile Thr Ile Asp Phe Val Arg Glu Ala Leu Arg Asp Leu Leu Ala
        355                 360                 365

Leu Gln Glu Lys Leu Val Thr Ile Asp Asn Ile Gln Lys Thr Val Ala
    370                 375                 380

Glu Tyr Tyr Lys Ile Lys Val Ala Asp Leu Leu Ser Lys Arg Arg Ser
385                 390                 395                 400

Arg Ser Val Ala Arg Pro Arg Gln Met Ala Met Ala Leu Ala Lys Glu
                405                 410                 415

Leu Thr Asn His Ser Leu Pro Glu Ile Gly Asp Ala Phe Gly Gly Arg
            420                 425                 430

Asp His Thr Thr Val Leu His Ala Cys Arg Lys Ile Glu Gln Leu Arg
```

```
        435                 440                 445

Glu Glu Ser His Asp Ile Lys Glu Asp Phe Ser Asn Leu Ile Arg Thr
    450                 455                 460

Leu Ser Ser
465
```

<210> 102
<211> 440
<212> PRT
<213> Thermatoga maritima

<400> 102

```
Met Lys Glu Arg Ile Leu Gln Glu Ile Lys Thr Arg Val Asn Arg Lys
  1               5                  10                  15

Ser Trp Glu Leu Trp Phe Ser Ser Phe Asp Val Lys Ser Ile Glu Gly
             20                  25                  30

Asn Lys Val Val Phe Ser Val Gly Asn Leu Phe Ile Lys Glu Trp Leu
         35                  40                  45

Glu Lys Lys Tyr Tyr Ser Val Leu Ser Lys Ala Val Lys Val Val Leu
     50                  55                  60

Gly Asn Asp Ala Thr Phe Glu Ile Thr Tyr Glu Ala Phe Glu Pro His
 65                  70                  75                  80

Ser Ser Tyr Ser Glu Pro Leu Val Lys Lys Arg Ala Val Leu Leu Thr
                 85                  90                  95

Pro Leu Asn Pro Asp Tyr Thr Phe Glu Asn Phe Val Val Gly Pro Gly
            100                 105                 110

Asn Ser Phe Ala Tyr His Ala Ala Leu Glu Val Ala Lys His Pro Gly
        115                 120                 125

Arg Tyr Asn Pro Leu Phe Ile Tyr Gly Gly Val Gly Leu Gly Lys Thr
    130                 135                 140

His Leu Leu Gln Ser Ile Gly Asn Tyr Val Val Gln Asn Glu Pro Asp
145                 150                 155                 160

Leu Arg Val Met Tyr Ile Thr Ser Glu Lys Phe Leu Asn Asp Leu Val
                165                 170                 175
```

```
Asp Ser Met Lys Glu Gly Lys Leu Asn Glu Phe Arg Glu Lys Tyr Arg
            180                 185                 190

Lys Lys Val Asp Ile Leu Leu Ile Asp Asp Val Gln Phe Leu Ile Gly
        195                 200                 205

Lys Thr Gly Val Gln Thr Glu Leu Phe His Thr Phe Asn Glu Leu His
    210                 215                 220

Asp Ser Gly Lys Gln Ile Val Ile Cys Ser Asp Arg Glu Pro Gln Lys
225                 230                 235                 240

Leu Ser Glu Phe Gln Asp Arg Leu Val Ser Arg Phe Gln Met Gly Leu
                245                 250                 255

Val Ala Lys Leu Glu Pro Pro Asp Glu Glu Thr Arg Lys Ser Ile Ala
            260                 265                 270

Arg Lys Met Leu Glu Ile Glu His Gly Glu Leu Pro Glu Glu Val Leu
        275                 280                 285

Asn Phe Val Ala Glu Asn Val Asp Asp Asn Leu Arg Arg Leu Arg Gly
    290                 295                 300

Ala Ile Ile Lys Leu Leu Val Tyr Lys Glu Thr Thr Gly Lys Glu Val
305                 310                 315                 320

Asp Leu Lys Glu Ala Ile Leu Leu Leu Lys Asp Phe Ile Lys Pro Asn
                325                 330                 335

Arg Val Lys Ala Met Asp Pro Ile Asp Glu Leu Ile Glu Ile Val Ala
            340                 345                 350

Lys Val Thr Gly Val Pro Arg Glu Glu Ile Leu Ser Asn Ser Arg Asn
        355                 360                 365

Val Lys Ala Leu Thr Ala Arg Arg Ile Gly Met Tyr Val Ala Lys Asn
    370                 375                 380

Tyr Leu Lys Ser Ser Leu Arg Thr Ile Ala Glu Lys Phe Asn Arg Ser
385                 390                 395                 400

His Pro Val Val Val Asp Ser Val Lys Lys Val Lys Asp Ser Leu Leu
                405                 410                 415

Lys Gly Asn Lys Gln Leu Lys Ala Leu Ile Asp Glu Val Ile Gly Glu
            420                 425                 430
```

```
Ile Ser Arg Arg Ala Leu Ser Gly
        435                 440


<210> 103
<211> 457
<212> PRT
<213> Helicobacter pylori

<400> 103
Met Asp Thr Asn Asn Asn Ile Glu Lys Glu Ile Leu Ala Leu Val Lys
  1               5                  10                  15

Gln Asn Pro Lys Val Ser Leu Ile Glu Tyr Glu Asn Tyr Phe Ser Gln
             20                  25                  30

Leu Lys Tyr Asn Pro Asn Ala Ser Lys Ser Asp Ile Ala Phe Phe Tyr
         35                  40                  45

Ala Pro Asn Gln Val Leu Cys Thr Thr Ile Thr Ala Lys Tyr Gly Ala
     50                  55                  60

Leu Leu Lys Glu Ile Leu Ser Gln Asn Lys Val Gly Met His Leu Ala
 65                  70                  75                  80

His Ser Val Asp Val Arg Ile Glu Val Ala Pro Lys Ile Gln Ile Asn
                 85                  90                  95

Ala Gln Ser Asn Ile Asn Tyr Lys Ala Ile Lys Thr Ser Val Lys Asp
            100                 105                 110

Ser Tyr Thr Phe Glu Asn Phe Val Val Gly Ser Cys Asn Asn Thr Val
        115                 120                 125

Tyr Glu Ile Ala Lys Lys Val Ala Gln Ser Asp Thr Pro Pro Tyr Asn
    130                 135                 140

Pro Val Leu Phe Tyr Gly Gly Thr Gly Leu Gly Lys Thr His Ile Leu
145                 150                 155                 160

Asn Ala Ile Gly Asn His Ala Leu Glu Lys His Lys Lys Val Val Leu
                165                 170                 175

Val Thr Ser Glu Asp Phe Leu Thr Asp Phe Leu Lys His Leu Asp Asn
            180                 185                 190

Lys Thr Met Asp Ser Phe Lys Ala Lys Tyr Arg His Cys Asp Phe Phe
        195                 200                 205
```

```
Leu Leu Asp Asp Ala Gln Phe Leu Gln Gly Lys Pro Lys Leu Glu Glu
    210                 215                 220

Glu Phe Phe His Thr Phe Asn Glu Leu His Ala Asn Ser Lys Gln Ile
225                 230                 235                 240

Val Leu Ile Ser Asp Arg Ser Pro Lys Asn Ile Ala Gly Leu Glu Asp
                245                 250                 255

Arg Leu Lys Ser Arg Phe Glu Trp Gly Ile Thr Ala Lys Val Met Pro
            260                 265                 270

Pro Asp Leu Glu Thr Lys Leu Ser Ile Val Lys Gln Lys Cys Gln Leu
        275                 280                 285

Asn Gln Ile Thr Leu Pro Glu Glu Val Met Glu Tyr Ile Ala Gln His
    290                 295                 300

Ile Ser Asp Asn Ile Arg Gln Met Glu Gly Ala Ile Ile Lys Ile Ser
305                 310                 315                 320

Val Asn Ala Asn Leu Met Asn Ala Ser Ile Asp Leu Asn Leu Ala Lys
                325                 330                 335

Thr Val Leu Glu Asp Leu Gln Lys Asp His Ala Glu Gly Ser Ser Leu
            340                 345                 350

Glu Asn Ile Leu Leu Ala Val Ala Gln Ser Leu Asn Leu Lys Ser Ser
        355                 360                 365

Glu Ile Lys Val Ser Ser Arg Gln Lys Asn Val Ala Leu Ala Arg Lys
    370                 375                 380

Leu Val Val Tyr Phe Ala Arg Leu Tyr Thr Pro Asn Pro Thr Leu Ser
385                 390                 395                 400

Leu Ala Gln Phe Leu Asp Leu Lys Asp His Ser Ser Ile Ser Lys Met
                405                 410                 415

Tyr Ser Gly Val Lys Lys Met Leu Glu Glu Glu Lys Ser Pro Phe Val
            420                 425                 430

Leu Ser Leu Arg Glu Glu Ile Lys Asn Arg Leu Asn Glu Leu Asn Asp
        435                 440                 445

Lys Lys Thr Ala Phe Asn Ser Ser Glu
    450                 455
```

<210> 104
<211> 1305
<212> DNA
<213> Thermus thermophilus

<400> 104
gtgtcgcacg aggccgtctg gcaacacgtt ctggagcaca tccgccgcag catcaccgag 60
gtggagttcc acacctggtt tgaaaggatc cgccccttgg ggatccggga cggggtgctg 120
gagctcgccg tgcccacctc ctttgccctg gactggatcc ggcgccacta cgccggcctc 180
atccaggagg gccctcggct cctcggggcc caggcgcccc ggtttgagct ccgggtggtg 240
cccggggtcg tagtccagga ggacatcttc cagcccccgc cgagcccccc ggcccaagct 300
caacccgaag ataccttaa aacttcgtgg tggggcccaa caactccatg gccccacggc 360
ggcgccgtgg ccgtggccga gtcccccggc cgggcctaca acccccctctt catctacggg 420
ggccgtggcc tgggaaagac ctacctgatg cacgccgtgg gcccactccg tgcgaagcgc 480
ttcccccaca tgagattaga gtacgtttcc acggaaactt tcaccaacga gctcatcaac 540
cggccatccg cgagggaccg gatgacggag ttccgggagc ggtaccgctc cgtggacctc 600
ctgctggtgg acgacgtcca gttcatcgcc ggaaaggagc gcacccagga ggagtttttc 660
cacaccttca acgcccttta cgaggcccac aagcagatca tcctctcctc cgaccggccg 720
cccaaggaca tcctcaccct ggaggcgcgc ctgcggagcc gctttgagtg gggcctgatc 780
accgacaatc cagcccccga cctggaaacc cggatcgcca tcctgaagat gaacgccagc 840
agcgggcctg aggatcccga ggacgccctg gagtacatcg cccggcaggt cacctccaac 900
atccgggagt gggaaggggc cctcatgcgg gcatcgcctt tcgcctccct caacggcgtt 960
gagctgaccc gcgccgtggc ggccaaggct ctccgacatc ttcgccccag ggagctggag 1020
gcggacccct tggagatcat ccgcaaagcg gcgggaccag ttcggcctga aaccccggga 1080
ggagctcacg gggagcgccg caagaaggag gtggtcctcc cccggcagct cgccatgtac 1140
ctggtgcggg agctcacccc ggcctccctg cccgagatcg accagctcaa cgacgaccgg 1200
gaccacacca cggtcctcta cgccatccag aaggtccagg agctcgcgga aagcgaccgg 1260
gaggtgcagg gcctcctccg caccctccgg gaggcgtgca catga 1305

<210> 105
<211> 434
<212> PRT
<213> Thermus thermophilus

<400> 105
Val Ser His Glu Ala Val Trp Gln His Val Leu Glu His Ile Arg Arg
1 5 10 15

Ser Ile Thr Glu Val Glu Phe His Thr Trp Phe Glu Arg Ile Arg Pro
20 25 30

Leu Gly Ile Arg Asp Gly Val Leu Glu Leu Ala Val Pro Thr Ser Phe
35 40 45

Ala Leu Asp Trp Ile Arg Arg His Tyr Ala Gly Leu Ile Gln Glu Gly

```
     50                  55                  60

Pro Arg Leu Leu Gly Ala Gln Ala Pro Arg Phe Glu Leu Arg Val Val
 65                  70                  75                  80

Pro Gly Val Val Val Gln Glu Asp Ile Phe Gln Pro Pro Pro Ser Pro
                 85                  90                  95

Pro Ala Gln Ala Gln Pro Glu Asp Thr Phe Lys Thr Ser Trp Trp Gly
            100                 105                 110

Pro Thr Thr Pro Trp Pro His Gly Gly Ala Val Ala Val Ala Glu Ser
        115                 120                 125

Pro Gly Arg Ala Tyr Asn Pro Leu Phe Ile Tyr Gly Gly Arg Gly Leu
    130                 135                 140

Gly Lys Thr Tyr Leu Met His Ala Val Gly Pro Leu Arg Ala Lys Arg
145                 150                 155                 160

Phe Pro His Met Arg Leu Glu Tyr Val Ser Thr Glu Thr Phe Thr Asn
                165                 170                 175

Glu Leu Ile Asn Arg Pro Ser Ala Arg Asp Arg Met Thr Glu Phe Arg
            180                 185                 190

Glu Arg Tyr Arg Ser Val Asp Leu Leu Leu Val Asp Asp Val Gln Phe
        195                 200                 205

Ile Ala Gly Lys Glu Arg Thr Gln Glu Glu Phe Phe His Thr Phe Asn
    210                 215                 220

Ala Leu Tyr Glu Ala His Lys Gln Ile Ile Leu Ser Ser Asp Arg Pro
225                 230                 235                 240

Pro Lys Asp Ile Leu Thr Leu Glu Ala Arg Leu Arg Ser Arg Phe Glu
                245                 250                 255

Trp Gly Leu Ile Thr Asp Asn Pro Ala Pro Asp Leu Glu Thr Arg Ile
            260                 265                 270

Ala Ile Leu Lys Met Asn Ala Ser Ser Gly Pro Glu Asp Pro Glu Asp
        275                 280                 285

Ala Leu Glu Tyr Ile Ala Arg Gln Val Thr Ser Asn Ile Arg Glu Trp
    290                 295                 300

Glu Gly Ala Leu Met Arg Ala Ser Pro Phe Ala Ser Leu Asn Gly Val
```

305 310 315 320

Glu Leu Thr Arg Ala Val Ala Ala Lys Ala Leu Arg His Leu Arg Pro
325 330 335

Arg Glu Leu Glu Ala Asp Pro Leu Glu Ile Ile Arg Lys Ala Ala Gly
340 345 350

Pro Val Arg Pro Glu Thr Pro Gly Gly Ala His Gly Glu Arg Arg Lys
355 360 365

Lys Glu Val Val Leu Pro Arg Gln Leu Ala Met Tyr Leu Val Arg Glu
370 375 380

Leu Thr Pro Ala Ser Leu Pro Glu Ile Asp Gln Leu Asn Asp Asp Arg
385 390 395 400

Asp His Thr Thr Val Leu Tyr Ala Ile Gln Lys Val Gln Glu Leu Ala
405 410 415

Glu Ser Asp Arg Glu Val Gln Gly Leu Leu Arg Thr Leu Arg Glu Ala
420 425 430

Cys Thr

<210> 106
<211> 1128
<212> DNA
<213> Thermus thermophilus

<400> 106
atgaacataa cggttcccaa aaaactcctc tcggaccagc tttccctcct ggagcgcatc 60
gtcccctcta gaagcgccaa ccccctctac acctacctgg ggctttacgc cgaggaaggg 120
gccttgatcc tcttcgggac caacggggag gtggacctcg aggtccgcct ccccgccgag 180
gcccaaagcc ttccccgggt gctcgtcccc gcccagccct tcttccagct ggtgcggagc 240
cttcctgggg acctcgtggc cctcggcctc gcctcggagc cgggccaggg ggggcagctg 300
gagctctcct ccgggcgttt ccgcacccgg ctcagcctgg cccctgccga gggctacccc 360
gagcttctgg tgcccgaggg ggaggacaag ggggccttcc ccctccggac gcggatgccc 420
tccggggagc tcgtcaaggc cttgacccac gtgcgctacg ccgcgagcaa cgaggagtac 480
cgggccatct tccgcggggt gcagctggag ttctcccccc agggcttccg ggcggtggcc 540
tccgacgggt accgcctcgc cctctacgac ctgcccctgc cccaagggtt ccaggccaag 600
gccgtggtcc ccgcccggag cgtggacgag atggtgcggg tcctgaaggg ggcggacggg 660
gccgaggccg tcctcgccct gggcgagggg gtgttggccc tggccctcga gggcggaagc 720
ggggtccgga tggccctccg cctcatggaa ggggagttcc ccgactacca gagggtcatc 780
ccccaggagt tcgccctcaa ggtccaggtg gaggggggagg ccctcaggga ggcggtgcgc 840
cgggtgagcg tcctctccga ccggcagaac caccgggtgg acctccttttt ggaggaaggc 900

cggatcctcc tctccgccga gggggactac ggcaaggggc aggaggaggt gcccgcccag 960
gtggaggggc cggacatggc cgtggcctac aacgcccgct acctcctcga ggccctcgcc 1020
cccgtggggg accgggccca cctgggcatc tccgggccca cgagcccgag cctcatctgg 1080
ggggacgggg aggggtaccg ggcggtggtg gtgcccctca gggtctag 1128

<210> 107
<211> 376
<212> PRT
<213> Thermus thermophilus

<400> 107
Met Asn Ile Thr Val Pro Lys Lys Leu Leu Ser Asp Gln Leu Ser Leu
1 5 10 15

Leu Glu Arg Ile Val Pro Ser Arg Ser Ala Asn Pro Leu Tyr Thr Tyr
20 25 30

Leu Gly Leu Tyr Ala Glu Glu Gly Ala Leu Ile Leu Phe Gly Thr Asn
35 40 45

Gly Glu Val Asp Leu Glu Val Arg Leu Pro Ala Glu Ala Gln Ser Leu
50 55 60

Pro Arg Val Leu Val Pro Ala Gln Pro Phe Phe Gln Leu Val Arg Ser
65 70 75 80

Leu Pro Gly Asp Leu Val Ala Leu Gly Leu Ala Ser Glu Pro Gly Gln
85 90 95

Gly Gly Gln Leu Glu Leu Ser Ser Gly Arg Phe Arg Thr Arg Leu Ser
100 105 110

Leu Ala Pro Ala Glu Gly Tyr Pro Glu Leu Leu Val Pro Glu Gly Glu
115 120 125

Asp Lys Gly Ala Phe Pro Leu Arg Thr Arg Met Pro Ser Gly Glu Leu
130 135 140

Val Lys Ala Leu Thr His Val Arg Tyr Ala Ala Ser Asn Glu Glu Tyr
145 150 155 160

Arg Ala Ile Phe Arg Gly Val Gln Leu Glu Phe Ser Pro Gln Gly Phe
165 170 175

Arg Ala Val Ala Ser Asp Gly Tyr Arg Leu Ala Leu Tyr Asp Leu Pro
180 185 190

```
Leu Pro Gln Gly Phe Gln Ala Lys Ala Val Val Pro Ala Arg Ser Val
        195                 200                 205

Asp Glu Met Val Arg Val Leu Lys Gly Ala Asp Gly Ala Glu Ala Val
    210                 215                 220

Leu Ala Leu Gly Glu Gly Val Leu Ala Leu Ala Leu Glu Gly Gly Ser
225                 230                 235                 240

Gly Val Arg Met Ala Leu Arg Leu Met Glu Gly Glu Phe Pro Asp Tyr
                245                 250                 255

Gln Arg Val Ile Pro Gln Glu Phe Ala Leu Lys Val Gln Val Glu Gly
            260                 265                 270

Glu Ala Leu Arg Glu Ala Val Arg Arg Val Ser Val Leu Ser Asp Arg
        275                 280                 285

Gln Asn His Arg Val Asp Leu Leu Leu Glu Glu Gly Arg Ile Leu Leu
    290                 295                 300

Ser Ala Glu Gly Asp Tyr Gly Lys Gly Gln Glu Glu Val Pro Ala Gln
305                 310                 315                 320

Val Glu Gly Pro Asp Met Ala Val Ala Tyr Asn Ala Arg Tyr Leu Leu
                325                 330                 335

Glu Ala Leu Ala Pro Val Gly Asp Arg Ala His Leu Gly Ile Ser Gly
            340                 345                 350

Pro Thr Ser Pro Ser Leu Ile Trp Gly Asp Gly Glu Gly Tyr Arg Ala
        355                 360                 365

Val Val Val Pro Leu Arg Val Glx
    370                 375
```

<210> 108
<211> 376
<212> PRT
<213> Thermus thermophilus

<400> 108

```
Met Asn Ile Thr Val Pro Lys Lys Leu Leu Ser Asp Gln Leu Ser Leu
  1               5                  10                  15

Leu Glu Arg Ile Val Pro Ser Arg Ser Ala Asn Pro Leu Tyr Thr Tyr
             20                  25                  30
```

```
Leu Gly Leu Tyr Ala Glu Glu Gly Ala Leu Ile Leu Phe Gly Thr Asn
         35                  40                  45

Gly Glu Val Asp Leu Glu Val Arg Leu Pro Ala Glu Ala Gln Ser Leu
     50                  55                  60

Pro Arg Val Leu Val Pro Ala Gln Pro Phe Phe Gln Leu Val Arg Ser
 65                  70                  75                  80

Leu Pro Gly Asp Leu Val Ala Leu Gly Leu Ala Ser Glu Pro Gly Gln
                 85                  90                  95

Gly Gly Gln Leu Glu Leu Ser Ser Gly Arg Phe Arg Thr Arg Leu Ser
            100                 105                 110

Leu Ala Pro Ala Glu Gly Tyr Pro Glu Leu Leu Val Pro Glu Gly Glu
        115                 120                 125

Asp Lys Gly Ala Phe Pro Leu Arg Thr Arg Met Pro Ser Gly Glu Leu
    130                 135                 140

Val Lys Ala Leu Thr His Val Arg Tyr Ala Ala Ser Asn Glu Glu Tyr
145                 150                 155                 160

Arg Ala Ile Phe Arg Gly Val Gln Leu Glu Phe Ser Pro Gln Gly Phe
                165                 170                 175

Arg Ala Val Ala Ser Asp Gly Tyr Arg Leu Ala Leu Tyr Asp Leu Pro
            180                 185                 190

Leu Pro Gln Gly Phe Gln Ala Lys Ala Val Val Pro Ala Arg Ser Val
        195                 200                 205

Asp Glu Met Val Arg Val Leu Lys Gly Ala Asp Gly Ala Glu Ala Val
    210                 215                 220

Leu Ala Leu Gly Glu Gly Val Leu Ala Leu Ala Leu Glu Gly Gly Ser
225                 230                 235                 240

Gly Val Arg Met Ala Leu Arg Leu Met Glu Gly Glu Phe Pro Asp Tyr
                245                 250                 255

Gln Arg Val Ile Pro Gln Glu Phe Ala Leu Lys Val Gln Val Glu Gly
            260                 265                 270

Glu Ala Leu Arg Glu Ala Val Arg Arg Val Ser Val Leu Ser Asp Arg
        275                 280                 285
```

```
Gln Asn His Arg Val Asp Leu Leu Leu Glu Glu Gly Arg Ile Leu Leu
    290                 295                 300

Ser Ala Glu Gly Asp Tyr Gly Lys Gly Gln Glu Glu Val Pro Ala Gln
305                 310                 315                 320

Val Glu Gly Pro Asp Met Ala Val Ala Tyr Asn Ala Arg Tyr Leu Leu
                325                 330                 335

Glu Ala Leu Ala Pro Val Gly Asp Arg Ala His Leu Gly Ile Ser Gly
            340                 345                 350

Pro Thr Ser Pro Ser Leu Ile Trp Gly Asp Gly Glu Gly Tyr Arg Ala
        355                 360                 365

Val Val Val Pro Leu Arg Val Glx
    370                 375


<210> 109
<211> 367
<212> PRT
<213> Escherichia coli

<400> 109
Met Lys Phe Thr Val Glu Arg Glu His Leu Leu Lys Pro Leu Gln Gln
  1               5                  10                  15

Val Ser Gly Pro Leu Gly Gly Arg Pro Thr Leu Pro Ile Leu Gly Asn
             20                  25                  30

Leu Leu Leu Gln Val Ala Asp Gly Thr Leu Ser Leu Thr Gly Thr Asp
         35                  40                  45

Leu Glu Met Glu Met Val Ala Arg Val Ala Leu Val Gln Pro His Glu
     50                  55                  60

Pro Gly Ala Thr Thr Val Pro Ala Arg Lys Phe Phe Asp Ile Cys Arg
 65                  70                  75                  80

Gly Leu Pro Glu Gly Ala Glu Ile Ala Val Gln Leu Glu Gly Glu Arg
                 85                  90                  95

Met Leu Val Arg Ser Gly Arg Ser Arg Phe Ser Leu Ser Thr Leu Pro
            100                 105                 110

Ala Ala Asp Phe Pro Asn Leu Asp Asp Trp Gln Ser Glu Val Glu Phe
```

```
        115                 120                 125

Thr Leu Pro Gln Ala Thr Met Lys Arg Leu Ile Glu Ala Thr Gln Phe
    130                 135                 140

Ser Met Ala His Gln Asp Val Arg Tyr Tyr Leu Asn Gly Met Leu Phe
145                 150                 155                 160

Glu Thr Glu Gly Glu Glu Leu Arg Thr Val Ala Thr Asp Gly His Arg
                165                 170                 175

Leu Ala Val Cys Ser Met Pro Ile Gly Gln Ser Leu Pro Ser His Ser
            180                 185                 190

Val Ile Val Pro Arg Lys Gly Val Ile Glu Leu Met Arg Met Leu Asp
        195                 200                 205

Gly Gly Asp Asn Pro Leu Arg Val Gln Ile Gly Ser Asn Asn Ile Arg
    210                 215                 220

Ala His Val Gly Asp Phe Ile Phe Thr Ser Lys Leu Val Asp Gly Arg
225                 230                 235                 240

Phe Pro Asp Tyr Arg Arg Val Leu Pro Lys Asn Pro Asp Lys His Leu
                245                 250                 255

Glu Ala Gly Cys Asp Leu Leu Lys Gln Ala Phe Ala Arg Ala Ala Ile
            260                 265                 270

Leu Ser Asn Glu Lys Phe Arg Gly Val Arg Leu Tyr Val Ser Glu Asn
        275                 280                 285

Gln Leu Lys Ile Thr Ala Asn Asn Pro Glu Gln Glu Glu Ala Glu Glu
    290                 295                 300

Ile Leu Asp Val Thr Tyr Ser Gly Ala Glu Met Glu Ile Gly Phe Asn
305                 310                 315                 320

Val Ser Tyr Val Leu Asp Val Leu Asn Ala Leu Lys Cys Glu Asn Val
                325                 330                 335

Arg Met Met Leu Thr Asp Ser Val Ser Ser Val Gln Ile Glu Asp Ala
            340                 345                 350

Ala Ser Gln Ser Ala Ala Tyr Val Val Met Pro Met Arg Leu Glx
        355                 360                 365
```

<210> 110
<211> 367
<212> PRT
<213> Proteus mirabilis

<400> 110
Met Lys Phe Ile Ile Glu Arg Glu Gln Leu Leu Lys Pro Leu Gln Gln
1 5 10 15

Val Ser Gly Pro Leu Gly Gly Arg Pro Thr Leu Pro Ile Leu Gly Asn
20 25 30

Leu Leu Leu Lys Val Thr Glu Asn Thr Leu Ser Leu Thr Gly Thr Asp
35 40 45

Leu Glu Met Glu Met Met Ala Arg Val Ser Leu Ser Gln Ser His Glu
50 55 60

Ile Gly Ala Thr Thr Val Pro Ala Arg Lys Phe Phe Asp Ile Trp Arg
65 70 75 80

Gly Leu Pro Glu Gly Ala Glu Ile Ser Val Glu Leu Asp Gly Asp Arg
85 90 95

Leu Leu Val Arg Ser Gly Arg Ser Arg Phe Ser Leu Ser Thr Leu Pro
100 105 110

Ala Ser Asp Phe Pro Asn Leu Asp Asp Trp Gln Ser Glu Val Glu Phe
115 120 125

Thr Leu Pro Gln Ala Thr Leu Lys Arg Leu Ile Glu Ser Thr Gln Phe
130 135 140

Ser Met Ala His Gln Asp Val Arg Tyr Tyr Leu Asn Gly Met Leu Phe
145 150 155 160

Glu Thr Glu Asn Thr Glu Leu Arg Thr Val Ala Thr Asp Gly His Arg
165 170 175

Leu Ala Val Cys Ala Met Asp Ile Gly Gln Ser Leu Pro Gly His Ser
180 185 190

Val Ile Val Pro Arg Lys Gly Val Ile Glu Leu Met Arg Leu Leu Asp
195 200 205

Gly Ser Gly Glu Ser Leu Leu Gln Leu Gln Ile Gly Ser Asn Asn Leu
210 215 220

```
Arg Ala His Val Gly Asp Phe Ile Phe Thr Ser Lys Leu Val Asp Gly
225                 230                 235                 240

Arg Phe Pro Asp Tyr Arg Arg Val Leu Pro Lys Asn Pro Thr Lys Thr
                245                 250                 255

Val Ile Ala Gly Cys Asp Ile Leu Lys Gln Ala Phe Ser Arg Ala Ala
            260                 265                 270

Ile Leu Ser Asn Glu Lys Phe Arg Gly Val Arg Ile Asn Leu Thr Asn
        275                 280                 285

Gly Gln Leu Lys Ile Thr Ala Asn Asn Pro Glu Gln Glu Glu Ala Glu
    290                 295                 300

Glu Ile Val Asp Val Gln Tyr Gln Gly Glu Glu Met Glu Ile Gly Phe
305                 310                 315                 320

Asn Val Ser Tyr Leu Leu Asp Val Leu Asn Thr Leu Lys Cys Glu Glu
                325                 330                 335

Val Lys Leu Leu Leu Thr Asp Ala Val Ser Ser Val Gln Val Glu Asn
            340                 345                 350

Val Ala Ser Ala Ala Ala Ala Tyr Val Val Met Pro Met Arg Leu
        355                 360                 365
```

<210> 111
<211> 366
<212> PRT
<213> Haemophilus influenzae

<400> 111

```
Met Gln Phe Ser Ile Ser Arg Glu Asn Leu Leu Lys Pro Leu Gln Gln
  1               5                  10                  15

Val Cys Gly Val Leu Ser Asn Arg Pro Asn Ile Pro Val Leu Asn Asn
             20                  25                  30

Val Leu Leu Gln Ile Glu Asp Tyr Arg Leu Thr Ile Thr Gly Thr Asp
         35                  40                  45

Leu Glu Val Glu Leu Ser Ser Gln Thr Gln Leu Ser Ser Ser Ser Glu
     50                  55                  60

Asn Gly Thr Phe Thr Ile Pro Ala Lys Lys Phe Leu Asp Ile Cys Arg
 65                  70                  75                  80
```

Thr Leu Ser Asp Asp Ser Glu Ile Thr Val Thr Phe Glu Gln Asp Arg
85 90 95

Ala Leu Val Gln Ser Gly Arg Ser Arg Phe Thr Leu Ala Thr Gln Pro
100 105 110

Ala Glu Glu Tyr Pro Asn Leu Thr Asp Trp Gln Ser Glu Val Asp Phe
115 120 125

Glu Leu Pro Gln Asn Thr Leu Arg Arg Leu Ile Glu Ala Thr Gln Phe
130 135 140

Ser Met Ala Asn Gln Asp Ala Arg Tyr Phe Leu Asn Gly Met Lys Phe
145 150 155 160

Glu Thr Glu Gly Asn Leu Leu Arg Thr Val Ala Thr Asp Gly His Arg
165 170 175

Leu Ala Val Cys Thr Ile Ser Leu Glu Gln Glu Leu Gln Asn His Ser
180 185 190

Val Ile Leu Pro Arg Lys Gly Val Leu Glu Leu Val Arg Leu Leu Glu
195 200 205

Thr Asn Asp Glu Pro Ala Arg Leu Gln Ile Gly Thr Asn Asn Leu Arg
210 215 220

Val His Leu Lys Asn Thr Val Phe Thr Ser Lys Leu Ile Asp Gly Arg
225 230 235 240

Phe Pro Asp Tyr Arg Arg Val Leu Pro Arg Asn Ala Thr Lys Ile Val
245 250 255

Glu Gly Asn Trp Glu Met Leu Lys Gln Ala Phe Ala Arg Ala Ser Ile
260 265 270

Leu Ser Asn Glu Arg Ala Arg Ser Val Arg Leu Ser Leu Lys Glu Asn
275 280 285

Gln Leu Lys Ile Thr Ala Ser Asn Thr Glu His Glu Glu Ala Glu Glu
290 295 300

Ile Val Asp Val Asn Tyr Asn Gly Glu Glu Leu Glu Val Gly Phe Asn
305 310 315 320

Val Thr Tyr Ile Leu Asp Val Leu Asn Ala Leu Lys Cys Asn Gln Val
325 330 335

```
Arg Met Cys Leu Thr Asp Ala Phe Ser Ser Cys Leu Ile Glu Asn Cys
            340                 345                 350

Glu Asp Ser Ser Cys Glu Tyr Val Ile Met Pro Met Arg Leu
        355                 360                 365


<210> 112
<211> 367
<212> PRT
<213> Pseudomonas putida

<400> 112
Met His Phe Thr Ile Gln Arg Glu Ala Leu Leu Lys Pro Leu Gln Leu
  1               5                  10                  15

Val Ala Gly Val Val Glu Arg Arg Gln Thr Leu Pro Val Leu Ser Asn
             20                  25                  30

Val Leu Leu Val Val Gln Gly Gln Gln Leu Ser Leu Thr Gly Thr Asp
         35                  40                  45

Leu Glu Val Glu Leu Val Gly Arg Val Gln Leu Glu Glu Pro Ala Glu
     50                  55                  60

Pro Gly Glu Ile Thr Val Pro Ala Arg Lys Leu Met Asp Ile Cys Lys
 65                  70                  75                  80

Ser Leu Pro Asn Asp Ala Leu Ile Asp Ile Lys Val Asp Glu Gln Lys
                 85                  90                  95

Leu Leu Val Lys Ala Gly Arg Ser Arg Phe Thr Leu Ser Thr Leu Pro
            100                 105                 110

Ala Asn Asp Phe Pro Thr Val Glu Glu Gly Pro Gly Ser Leu Thr Cys
        115                 120                 125

Asn Leu Glu Gln Ser Lys Leu Arg Arg Leu Ile Glu Arg Thr Ser Phe
    130                 135                 140

Ala Met Ala Gln Gln Asp Val Arg Tyr Tyr Leu Asn Gly Met Leu Leu
145                 150                 155                 160

Glu Val Ser Arg Asn Thr Leu Arg Ala Val Ser Thr Asp Gly His Arg
                165                 170                 175

Leu Ala Leu Cys Ser Met Ser Ala Pro Ile Glu Gln Glu Asp Arg His
```

```
            180                 185                 190

Gln Val Ile Val Pro Arg Lys Gly Ile Leu Glu Leu Ala Arg Leu Leu
        195                 200                 205

Thr Asp Pro Glu Gly Met Val Ser Ile Val Leu Gly Gln His His Ile
    210                 215                 220

Arg Ala Thr Thr Gly Glu Phe Thr Phe Thr Ser Lys Leu Val Asp Gly
225                 230                 235                 240

Lys Phe Pro Asp Tyr Glu Arg Val Leu Pro Lys Gly Gly Asp Lys Leu
                245                 250                 255

Val Val Gly Asp Arg Gln Ala Leu Arg Glu Ala Phe Ser Arg Thr Ala
            260                 265                 270

Ile Leu Ser Asn Glu Lys Tyr Arg Gly Ile Arg Leu Gln Leu Ala Ala
        275                 280                 285

Gly Gln Leu Lys Ile Gln Ala Asn Asn Pro Glu Gln Glu Glu Ala Glu
    290                 295                 300

Glu Glu Ile Ser Val Asp Tyr Glu Gly Ser Ser Leu Glu Ile Gly Phe
305                 310                 315                 320

Asn Val Ser Tyr Leu Leu Asp Val Leu Gly Val Met Thr Thr Glu Gln
                325                 330                 335

Val Arg Leu Ile Leu Ser Asp Ser Asn Ser Ser Ala Leu Leu Gln Glu
            340                 345                 350

Ala Gly Asn Asp Asp Ser Ser Tyr Val Val Met Pro Met Arg Leu
        355                 360                 365
```

<210> 113
<211> 366
<212> PRT
<213> Buchnera aphidicola

<400> 113

```
Met Lys Phe Thr Ile Gln Asn Asp Ile Leu Thr Lys Asn Leu Lys Lys
  1               5                  10                  15

Ile Thr Arg Val Leu Val Lys Asn Ile Ser Phe Pro Ile Leu Glu Asn
             20                  25                  30
```

```
Ile Leu Ile Gln Val Glu Asp Gly Thr Leu Ser Leu Thr Thr Thr Asn
         35                  40                  45

Leu Glu Ile Glu Leu Ile Ser Lys Ile Glu Ile Ile Thr Lys Tyr Ile
     50                  55                  60

Pro Gly Lys Thr Thr Ile Ser Gly Arg Lys Ile Leu Asn Ile Cys Arg
 65                  70                  75                  80

Thr Leu Ser Glu Lys Ser Lys Ile Lys Met Gln Leu Lys Asn Lys Lys
                 85                  90                  95

Met Tyr Ile Ser Ser Glu Asn Ser Asn Tyr Ile Leu Ser Thr Leu Ser
            100                 105                 110

Ala Asp Thr Phe Pro Asn His Gln Asn Phe Asp Tyr Ile Ser Lys Phe
        115                 120                 125

Asp Ile Ser Ser Asn Ile Leu Lys Glu Met Ile Glu Lys Thr Glu Phe
    130                 135                 140

Ser Met Gly Lys Gln Asp Val Arg Tyr Tyr Leu Asn Gly Met Leu Leu
145                 150                 155                 160

Glu Lys Lys Asp Lys Phe Leu Arg Ser Val Ala Thr Asp Gly Tyr Arg
                165                 170                 175

Leu Ala Ile Ser Tyr Thr Gln Leu Lys Lys Asp Ile Asn Phe Phe Ser
            180                 185                 190

Ile Ile Ile Pro Asn Lys Ala Val Met Glu Leu Leu Lys Leu Leu Asn
        195                 200                 205

Thr Gln Pro Gln Leu Leu Asn Ile Leu Ile Gly Ser Asn Ser Ile Arg
    210                 215                 220

Ile Tyr Thr Lys Asn Leu Ile Phe Thr Thr Gln Leu Ile Glu Gly Glu
225                 230                 235                 240

Tyr Pro Asp Tyr Lys Ser Val Leu Phe Lys Glu Lys Lys Asn Pro Ile
                245                 250                 255

Ile Thr Asn Ser Ile Leu Leu Lys Lys Ser Leu Leu Arg Val Ala Ile
            260                 265                 270

Leu Ala His Glu Lys Phe Cys Gly Ile Glu Ile Lys Ile Glu Asn Gly
        275                 280                 285
```

Lys Phe Lys Val Leu Ser Asp Asn Gln Glu Glu Glu Thr Ala Glu Asp
290 295 300

Leu Phe Glu Ile Asp Tyr Phe Gly Glu Lys Ile Glu Ile Ser Ile Asn
305 310 315 320

Val Tyr Tyr Leu Leu Asp Val Ile Asn Asn Ile Lys Ser Glu Asn Ile
325 330 335

Ala Leu Phe Leu Asn Lys Ser Lys Ser Ser Ile Gln Ile Glu Ala Glu
340 345 350

Asn Asn Ser Ser Asn Ala Tyr Val Val Met Leu Leu Lys Arg
355 360 365

<210> 114
<211> 39
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: primer

<400> 114
gtgtggatcc tcgtcccccct catgcgcgac caggaaggg 39

<210> 115
<211> 27
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: primer

<400> 115
gtgtggatcc gtggtgacct tagccac 27

<210> 116
<211> 30
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: primer

<400> 116
ttcgtgtccg aggaccttgt ggtccacaac 30

<210> 117
<211> 3514
<212> DNA
<213> Aquifex aeolicus

<400> 117
atgagtaagg atttcgtcca ccttcacctg cacacccagt tctcactcct ggacggggct 60
ataaagatag acgagctcgt gaaaaaggca aaggagtatg gatacaaagc tgtcggaatg 120
tcagaccacg gaaacctctt cggttcgtat aaattctaca aagccctgaa ggcggaagga 180
attaagccca taatcggcat ggaagcctac tttaccacgg gttcgaggtt tgacagaaag 240
actaaaacga gcgaggacaa cataaccgac aagtacaacc accacctcat acttatagca 300
aaggacgaaa aggtctaaag aacttaatga agctctcaac cctcgcctac aaagaaggtt 360
tttactacaa acccagaatt gattacgaac tccttgaaaa gtacggggag ggcctaatag 420
cccttaccgc atgcctgaaa ggtgttccca cctactacgc ttctataaac gaagtgaaaa 480
aggcggagga atgggtaaag aagttcaagg atatattcgg agatgacctt tatttagaac 540
ttcaagcgaa caacattcca gaacaggaag tggcaaacag gaacttaata gagatagcca 600
aaaagtacga tgtgaaactc atagcgacgc aggacgccca ctacctcaat cccgaagaca 660
ggtacgccca cacggttctt atggcacttc aaatgaaaaa gaccattcac gaactgagtt 720
cgggaaactt caagtgttca aacgaagacc ttcactttgc tccacccgag tacatgtgga 780
aaaagtttga aggtaagttc gaaggctggg aaaaggcact cctgaacact ctcgaggtaa 840
tggaaaagac agcggacagc tttgagatat ttgaaaactc cacctacctc cttcccaagt 900
acgacgttcc gcccgacaaa acccttgagg aatacctcag agaactcgcg tacaaaggtt 960
taagacagag gatagaaagg ggacaagcta aggatactaa agagtactgg gagaggctcg 1020
agtacgaact ggaagttata aacaaaatgg gctttgcggg atacttcttg atagttcagg 1080
acttcataaa ctgggctaag aaaaacgaca tacctgttgg acccggaagg ggaagtgctg 1140
gaggttccct cgtcgcatac gccatcggaa taacggacgt tgaccctata aagcacggat 1200
tccttttga gaggttctta aaccccgaaa gggtttccat gccggatata gacgtggatt 1260
tctgtcagga caacagggaa aaggtcatag agtacgtaag gaacaagtac ggacacgaca 1320
acgtagctca gataatcacc tacaacgtaa tgaaggcgaa gcaaacactg agagacgtcg 1380
caagggccat gggactcccc tactccaccg cggacaaact cgcaaaactc attcctcagg 1440
gggacgttca gggaacgtgg ctcagtctgg aagagatgta caaaacgcct gtggaggaac 1500
tccttcagaa gtacggagaa cacagaacgg acatagagga caacgtaaag aagttcagac 1560
agatatgcga agaaagtccg gagataaaac agctcgttga gacggccctg aagcttgaag 1620
gtctcacgag acacacctcc ctccacgccg cgggagtggt tatagcacca aagcccttga 1680
gcgagctcgt tcccctctac tacgataaag agggcgaagt cgcaacccag tacgacatgg 1740
ttcagctcga agaactcggt ctcctgaaga tggacttcct cggactcaaa accctcacag 1800
aactgaaact catgaaagaa ctcataaagg aaagacacgg agtggatata aacttccttg 1860
aacttcccct tgacgacccg aaagtttaca aactccttca ggaaggaaaa accacgggag 1920
tgttccagct cgaaagcagg ggaatgaaag aactcctgaa gaaactaaag cccgacagct 1980
ttgacgacat cgttgcggtc ctcgcactct acagacccgg acctctaaag agcggactcg 2040
ttgacacata cattaagaga aagcacggaa aagaacccgt tgagtacccc ttcccggagc 2100
ttgaacccgt ccttaaggaa acctacggag taatcgttta tcaggaacag gtgatgaaga 2160
tgtctcagat actttccggc tttactcccg gagaggcgga taccctcaga aaggcgatag 2220
gtaagaagaa agcggattta atggctcaga tgaaagacaa gttcatacag ggagcggtgg 2280

aaaggggata ccctgaagaa aagataagga agctctggga agacatagag aagttcgctt 2340
cctactcctt caacaagtct cactcggtag cttacgggta catctcctac tggaccgcct 2400
acgttaaagc ccactatccc gcggagttct tcgcggtaaa actcacaact gaaaagaacg 2460
acaacaagtt cctcaacctc ataaaagacg ctaaactctt cggatttgag atacttcccc 2520
ccgacataaa caagagtgat gtaggattta cgatagaagg tgaaaacagg ataaggttcg 2580
ggcttgcgag gataaaggga gtgggagagg aaactgctaa gataatcgtt gaagctagaa 2640
agaagtataa gcagttcaaa gggcttgcgg acttcataaa caaaaccaag aacaggaaga 2700
taaacaagaa agtcgtggaa gcactcgtaa aggcaggggc ttttgacttt actaagaaaa 2760
agaggaaaga actactcgct aaagtggcaa actctgaaaa agcattaatg gctacacaaa 2820
actccctttt cggtgcaccg aaagaagaag tggaagaact cgacccctta aagcttgaaa 2880
aggaagttct cggtttttac atttcagggc acccccttga caactacgaa aagctcctca 2940
agaaccgcta cacacccatt gaagatttag aagagtggga caaggaaagc gaagcggtgc 3000
ttacaggagt tatcacggaa ctcaaagtaa aaaagacgaa aaacggagat tacatggcgg 3060
tcttcaacct cgttgacaag acgggactaa tagagtgtgt cgtcttcccg ggagtttacg 3120
aagaggcaaa ggaactgata gaagaggaca gagtagtggt agtcaaaggt tttctggacg 3180
aggaccttga aacggaaaat gtcaagttcg tggtgaaaga ggttttctcc cctgaggagt 3240
tcgcaaagga gatgaggaat acccttttata tattcttaaa aagagagcaa gccctaaacg 3300
gcgttgccga aaaactaaag ggaattattg aaaacaacag gacggaggac ggatacaact 3360
tggttctcac ggttgatctg ggagactact tcgttgattt agcactccca caagatatga 3420
aactaaaggc tgacagaaag gttgtagagg agatagaaaa actgggagtg aaggtcataa 3480
tttagtaaat aacccttact tccgagtagt cccc 3514

<210> 118
<211> 1161
<212> PRT
<213> Aquifex aeolicus

<400> 118
Met Ser Lys Asp Phe Val His Leu His Leu His Thr Gln Phe Ser Leu
1 5 10 15

Leu Asp Gly Ala Ile Lys Ile Asp Glu Leu Val Lys Lys Ala Lys Glu
20 25 30

Tyr Gly Tyr Lys Ala Val Gly Met Ser Asp His Gly Asn Leu Phe Gly
35 40 45

Ser Tyr Lys Phe Tyr Lys Ala Leu Lys Ala Glu Gly Ile Lys Pro Ile
50 55 60

Ile Gly Met Glu Ala Tyr Phe Thr Thr Gly Ser Arg Phe Asp Arg Lys
65 70 75 80

Thr Lys Thr Ser Glu Asp Asn Ile Thr Asp Lys Tyr Asn His His Leu
85 90 95

Ile Leu Ile Ala Lys Asp Asp Lys Gly Leu Lys Asn Leu Met Lys Leu

```
            100                 105                 110
Ser Thr Leu Ala Tyr Lys Glu Gly Phe Tyr Tyr Lys Pro Arg Ile Asp
        115                 120                 125
Tyr Glu Leu Leu Glu Lys Tyr Gly Glu Gly Leu Ile Ala Leu Thr Ala
    130                 135                 140
Cys Leu Lys Gly Val Pro Thr Tyr Tyr Ala Ser Ile Asn Glu Val Lys
145                 150                 155                 160
Lys Ala Glu Glu Trp Val Lys Lys Phe Lys Asp Ile Phe Gly Asp Asp
                165                 170                 175
Leu Tyr Leu Glu Leu Gln Ala Asn Asn Ile Pro Glu Gln Glu Val Ala
            180                 185                 190
Asn Arg Asn Leu Ile Glu Ile Ala Lys Lys Tyr Asp Val Lys Leu Ile
        195                 200                 205
Ala Thr Gln Asp Ala His Tyr Leu Asn Pro Glu Asp Arg Tyr Ala His
    210                 215                 220
Thr Val Leu Met Ala Leu Gln Met Lys Lys Thr Ile His Glu Leu Ser
225                 230                 235                 240
Ser Gly Asn Phe Lys Cys Ser Asn Glu Asp Leu His Phe Ala Pro Pro
                245                 250                 255
Glu Tyr Met Trp Lys Lys Phe Glu Gly Lys Phe Glu Gly Trp Glu Lys
            260                 265                 270
Ala Leu Leu Asn Thr Leu Glu Val Met Glu Lys Thr Ala Asp Ser Phe
        275                 280                 285
Glu Ile Phe Glu Asn Ser Thr Tyr Leu Leu Pro Lys Tyr Asp Val Pro
    290                 295                 300
Pro Asp Lys Thr Leu Glu Glu Tyr Leu Arg Glu Leu Ala Tyr Lys Gly
305                 310                 315                 320
Leu Arg Gln Arg Ile Glu Arg Gly Gln Ala Lys Asp Thr Lys Glu Tyr
                325                 330                 335
Trp Glu Arg Leu Glu Tyr Glu Leu Glu Val Ile Asn Lys Met Gly Phe
            340                 345                 350
Ala Gly Tyr Phe Leu Ile Val Gln Asp Phe Ile Asn Trp Ala Lys Lys
```

355 360 365

Asn Asp Ile Pro Val Gly Pro Gly Arg Gly Ser Ala Gly Gly Ser Leu
370 375 380

Val Ala Tyr Ala Ile Gly Ile Thr Asp Val Asp Pro Ile Lys His Gly
385 390 395 400

Phe Leu Phe Glu Arg Phe Leu Asn Pro Glu Arg Val Ser Met Pro Asp
405 410 415

Ile Asp Val Asp Phe Cys Gln Asp Asn Arg Glu Lys Val Ile Glu Tyr
420 425 430

Val Arg Asn Lys Tyr Gly His Asp Asn Val Ala Gln Ile Ile Thr Tyr
435 440 445

Asn Val Met Lys Ala Lys Gln Thr Leu Arg Asp Val Ala Arg Ala Met
450 455 460

Gly Leu Pro Tyr Ser Thr Ala Asp Lys Leu Ala Lys Leu Ile Pro Gln
465 470 475 480

Gly Asp Val Gln Gly Thr Trp Leu Ser Leu Glu Glu Met Tyr Lys Thr
485 490 495

Pro Val Glu Glu Leu Leu Gln Lys Tyr Gly Glu His Arg Thr Asp Ile
500 505 510

Glu Asp Asn Val Lys Lys Phe Arg Gln Ile Cys Glu Glu Ser Pro Glu
515 520 525

Ile Lys Gln Leu Val Glu Thr Ala Leu Lys Leu Glu Gly Leu Thr Arg
530 535 540

His Thr Ser Leu His Ala Ala Gly Val Val Ile Ala Pro Lys Pro Leu
545 550 555 560

Ser Glu Leu Val Pro Leu Tyr Tyr Asp Lys Glu Gly Glu Val Ala Thr
565 570 575

Gln Tyr Asp Met Val Gln Leu Glu Glu Leu Gly Leu Leu Lys Met Asp
580 585 590

Phe Leu Gly Leu Lys Thr Leu Thr Glu Leu Lys Leu Met Lys Glu Leu
595 600 605

Ile Lys Glu Arg His Gly Val Asp Ile Asn Phe Leu Glu Leu Pro Leu

610 615 620

Asp Asp Pro Lys Val Tyr Lys Leu Leu Gln Glu Gly Lys Thr Thr Gly
625 630 635 640

Val Phe Gln Leu Glu Ser Arg Gly Met Lys Glu Leu Leu Lys Lys Leu
645 650 655

Lys Pro Asp Ser Phe Asp Asp Ile Val Ala Val Leu Ala Leu Tyr Arg
660 665 670

Pro Gly Pro Leu Lys Ser Gly Leu Val Asp Thr Tyr Ile Lys Arg Lys
675 680 685

His Gly Lys Glu Pro Val Glu Tyr Pro Phe Pro Glu Leu Glu Pro Val
690 695 700

Leu Lys Glu Thr Tyr Gly Val Ile Val Tyr Gln Glu Gln Val Met Lys
705 710 715 720

Met Ser Gln Ile Leu Ser Gly Phe Thr Pro Gly Glu Ala Asp Thr Leu
725 730 735

Arg Lys Ala Ile Gly Lys Lys Lys Ala Asp Leu Met Ala Gln Met Lys
740 745 750

Asp Lys Phe Ile Gln Gly Ala Val Glu Arg Gly Tyr Pro Glu Glu Lys
755 760 765

Ile Arg Lys Leu Trp Glu Asp Ile Glu Lys Phe Ala Ser Tyr Ser Phe
770 775 780

Asn Lys Ser His Ser Val Ala Tyr Gly Tyr Ile Ser Tyr Trp Thr Ala
785 790 795 800

Tyr Val Lys Ala His Tyr Pro Ala Glu Phe Phe Ala Val Lys Leu Thr
805 810 815

Thr Glu Lys Asn Asp Asn Lys Phe Leu Asn Leu Ile Lys Asp Ala Lys
820 825 830

Leu Phe Gly Phe Glu Ile Leu Pro Pro Asp Ile Asn Lys Ser Asp Val
835 840 845

Gly Phe Thr Ile Glu Gly Glu Asn Arg Ile Arg Phe Gly Leu Ala Arg
850 855 860

Ile Lys Gly Val Gly Glu Glu Thr Ala Lys Ile Ile Val Glu Ala Arg

865 870 875 880

Lys Lys Tyr Lys Gln Phe Lys Gly Leu Ala Asp Phe Ile Asn Lys Thr
885 890 895

Lys Asn Arg Lys Ile Asn Lys Lys Val Val Glu Ala Leu Val Lys Ala
900 905 910

Gly Ala Phe Asp Phe Thr Lys Lys Lys Arg Lys Glu Leu Leu Ala Lys
915 920 925

Val Ala Asn Ser Glu Lys Ala Leu Met Ala Thr Gln Asn Ser Leu Phe
930 935 940

Gly Ala Pro Lys Glu Glu Val Glu Glu Leu Asp Pro Leu Lys Leu Glu
945 950 955 960

Lys Glu Val Leu Gly Phe Tyr Ile Ser Gly His Pro Leu Asp Asn Tyr
965 970 975

Glu Lys Leu Leu Lys Asn Arg Tyr Thr Pro Ile Glu Asp Leu Glu Glu
980 985 990

Trp Asp Lys Glu Ser Glu Ala Val Leu Thr Gly Val Ile Thr Glu Leu
995 1000 1005

Lys Val Lys Lys Thr Lys Asn Gly Asp Tyr Met Ala Val Phe Asn Leu
1010 1015 1020

Val Asp Lys Thr Gly Leu Ile Glu Cys Val Val Phe Pro Gly Val Tyr
1025 1030 1035 1040

Glu Glu Ala Lys Glu Leu Ile Glu Glu Asp Arg Val Val Val Val Lys
1045 1050 1055

Gly Phe Leu Asp Glu Asp Leu Glu Thr Glu Asn Val Lys Phe Val Val
1060 1065 1070

Lys Glu Val Phe Ser Pro Glu Glu Phe Ala Lys Glu Met Arg Asn Thr
1075 1080 1085

Leu Tyr Ile Phe Leu Lys Arg Glu Gln Ala Leu Asn Gly Val Ala Glu
1090 1095 1100

Lys Leu Lys Gly Ile Ile Glu Asn Asn Arg Thr Glu Asp Gly Tyr Asn
1105 1110 1115 1120

Leu Val Leu Thr Val Asp Leu Gly Asp Tyr Phe Val Asp Leu Ala Leu

1125 1130 1135

Pro Gln Asp Met Lys Leu Lys Ala Asp Arg Lys Val Val Glu Glu Ile
1140 1145 1150

Glu Lys Leu Gly Val Lys Val Ile Ile
1155 1160

<210> 119
<211> 2408
<212> DNA
<213> Aquifex aeolicus

<400> 119
atgaactacg ttcccttcgc gagaaagtac agaccgaaat tcttcaggga agtaatagga 60
caggaagctc ccgtaaggat actcaaaaac gctataaaaa acgacagagt ggctcacgcc 120
tacctctttg ccggaccgag gggggttggg aagacgacta ttgcaagaat tctcgcaaaa 180
gctttgaact gtaaaaatcc ctccaaaggt gagccctgcg gtgagtgcga aaactgcagg 240
gagatagaca ggggtgtgtt ccctgactta attgaaatgg atgccgcctc aaacaggggt 300
atagacgacg taagggcatt aaaagaagcg gtcaattaca aacctataaa aggaaagtac 360
aaggtttaca taatagacga agctcacatg ctcacgaaag aagctttcaa cgctctctta 420
aaaaccctcg aagagccccc tcccagaact gttttcgtcc tttgtaccac ggagtacgac 480
aaaattcttc ccacgatact ctcaaggtgt cagaggataa tcttctcaaa ggtaagaaag 540
gaaaaagtaa tagagtatct aaaaaagata tgtgaaaagg aagggattga gtgcgaagag 600
ggagcccttg aggttctggc tcatgcctct gaagggtgca tgagggatgc agcctctctc 660
ctggaccagg cgagcgttta cggggaaggc agggtaacaa aagaagtagt ggagaacttc 720
ctcggaattc tcagtcagga aagcgttagg agttttctga aattgcttct gaactcagaa 780
gtggacgaag ctataaagtt cctcagagaa ctctcagaaa agggctacaa cctgaccaag 840
ttttgggaga tgttagaaga ggaagtgaga aacgcaattt tagtaaagag cctgaaaaat 900
cccgaaagcg tggttcagaa ctggcaggat tacgaagact tcaaagacta ccctctggaa 960
gccctcctct acgttgagaa cctgataaac aggggtaaag ttgaagcgag aacgagagaa 1020
cccttaagag cctttgaact cgcggtaata aagagcctta tagtcaaaga cataattccc 1080
gtatcccagc tcggaagtgt ggtaaaggaa accaaaaagg aagaaaagaa agttgaagta 1140
aaagaagagc caaaagtaaa agaagaaaaa ccaaaggagc aggaagagga caggttccag 1200
aaagttttaa acgctgtgga cggcaaaatc cttaaaagaa tacttgaagg ggcaaaaagg 1260
gaagaaagag acggaaaaat cgtcctaaag atagaagcct cttatctgag aaccatgaaa 1320
aaggaatttg actcactaaa ggagactttt ccttttttag agtttgaacc cgtggaggat 1380
aaaaaaaaac ctcagaagtc cagcgggacg aggctgtttt aaaggtaaag gagctcttca 1440
atgcaaaaat actcaaagta cgaagtaaaa gctaaggtca taaaggtgag aatgcccgtg 1500
gaagagatag ggctgtttaa cgcactaata gacggcttgc ccaggtacgc actcacgagg 1560
acgaaggaaa agggaaaggg agaagttttc gttttagcga ctccttataa agtcaaggaa 1620
ttgatggaag ctatggaggg tatgaaaaaa cacataaagg atttagaaat cctcggagag 1680
acggatgagg atttaacttt ttaaagtatg ggtgtatctg agcaaaggtt taagctaaaa 1740
acaaacctga aacccgcagg ggaccagccg aaagccataa aaaaactcct tgaaaaccta 1800
aggaaaggcg taaaagaaca aacacttctc ggagtcacgg gaagcggaaa gacttttact 1860
ctagcaaacg taatagcgaa gtacaacaaa ccaactcttg tggtagttca caacaaaatt 1920
ctcgcggcac agctatacag ggagtttaaa gaactattcc ctgaaaacgc tgtagagtac 1980

tttgtctctt actacgacta ttaccaacct gaagcctaca ttcccgaaaa agatttatac 2040
atagaaaagg acgcgagtat aaacgaaagc tggaacgttt cagacactcc gccacgatat 2100
ccgttctaga aaggagggac gttatagtag ttgcttcagt ttcttgcata tacggactcg 2160
ggaaacctga gcactacgaa aacctgagga taaaactcca aaggggaata agactgaact 2220
tgagtaagct cctgaggaaa ctcgttgagc taggatatca gagaaatgac tttgccataa 2280
agagggctac cttctcggtt aggggagacg tggttgagat agtcccttct cacacggaag 2340
attacctcgt gagggtagag ttctgggacg acgaagttga aagaatagtc ctcatggacg 2400
ctctgaac 2408

<210> 120
<211> 473
<212> PRT
<213> Aquifex aeolicus

<400> 120
Met Asn Tyr Val Pro Phe Ala Arg Lys Tyr Arg Pro Lys Phe Phe Arg
1 5 10 15

Glu Val Ile Gly Gln Glu Ala Pro Val Arg Ile Leu Lys Asn Ala Ile
20 25 30

Lys Asn Asp Arg Val Ala His Ala Tyr Leu Phe Ala Gly Pro Arg Gly
35 40 45

Val Gly Lys Thr Thr Ile Ala Arg Ile Leu Ala Lys Ala Leu Asn Cys
50 55 60

Lys Asn Pro Ser Lys Gly Glu Pro Cys Gly Glu Cys Glu Asn Cys Arg
65 70 75 80

Glu Ile Asp Arg Gly Val Phe Pro Asp Leu Ile Glu Met Asp Ala Ala
85 90 95

Ser Asn Arg Gly Ile Asp Asp Val Arg Ala Leu Lys Glu Ala Val Asn
100 105 110

Tyr Lys Pro Ile Lys Gly Lys Tyr Lys Val Tyr Ile Ile Asp Glu Ala
115 120 125

His Met Leu Thr Lys Glu Ala Phe Asn Ala Leu Leu Lys Thr Leu Glu
130 135 140

Glu Pro Pro Pro Arg Thr Val Phe Val Leu Cys Thr Thr Glu Tyr Asp
145 150 155 160

Lys Ile Leu Pro Thr Ile Leu Ser Arg Cys Gln Arg Ile Ile Phe Ser
165 170 175

Lys Val Arg Lys Glu Lys Val Ile Glu Tyr Leu Lys Lys Ile Cys Glu
180 185 190

Lys Glu Gly Ile Glu Cys Glu Glu Gly Ala Leu Glu Val Leu Ala His
195 200 205

Ala Ser Glu Gly Cys Met Arg Asp Ala Ala Ser Leu Leu Asp Gln Ala
210 215 220

Ser Val Tyr Gly Glu Gly Arg Val Thr Lys Glu Val Val Glu Asn Phe
225 230 235 240

Leu Gly Ile Leu Ser Gln Glu Ser Val Arg Ser Phe Leu Lys Leu Leu
245 250 255

Leu Asn Ser Glu Val Asp Glu Ala Ile Lys Phe Leu Arg Glu Leu Ser
260 265 270

Glu Lys Gly Tyr Asn Leu Thr Lys Phe Trp Glu Met Leu Glu Glu Glu
275 280 285

Val Arg Asn Ala Ile Leu Val Lys Ser Leu Lys Asn Pro Glu Ser Val
290 295 300

Val Gln Asn Trp Gln Asp Tyr Glu Asp Phe Lys Asp Tyr Pro Leu Glu
305 310 315 320

Ala Leu Leu Tyr Val Glu Asn Leu Ile Asn Arg Gly Lys Val Glu Ala
325 330 335

Arg Thr Arg Glu Pro Leu Arg Ala Phe Glu Leu Ala Val Ile Lys Ser
340 345 350

Leu Ile Val Lys Asp Ile Ile Pro Val Ser Gln Leu Gly Ser Val Val
355 360 365

Lys Glu Thr Lys Lys Glu Glu Lys Lys Val Glu Val Lys Glu Glu Pro
370 375 380

Lys Val Lys Glu Glu Lys Pro Lys Glu Gln Glu Glu Asp Arg Phe Gln
385 390 395 400

Lys Val Leu Asn Ala Val Asp Gly Lys Ile Leu Lys Arg Ile Leu Glu
405 410 415

Gly Ala Lys Arg Glu Glu Arg Asp Gly Lys Ile Val Leu Lys Ile Glu
420 425 430

```
Ala Ser Tyr Leu Arg Thr Met Lys Lys Glu Phe Asp Ser Leu Lys Glu
        435                 440                 445

Thr Phe Pro Phe Leu Glu Phe Glu Pro Val Glu Asp Lys Lys Lys Pro
    450                 455                 460

Gln Lys Ser Ser Gly Thr Arg Leu Phe
465                 470
```

<210> 121
<211> 1090
<212> DNA
<213> Aquifex aeolicus

<400> 121

```
atgcgcgtta aggtggacag ggaggagctt gaagaggttc ttaaaaaagc aagagaaagc 60
acggaaaaaa aagccgcact cccgatactc gcgaacttct tactctccgc aaaagaggaa 120
aacttaatcg taagggcaac ggacttggaa aactaccttg tagtctccgt aaagggggag 180
gttgaagagg aaggagaggt ttgcgtccac tctcaaaaac tctacgatat agtcaagaac 240
ttaaattccg cttacgttta ccttcatacg gaaggtgaaa aactcgtcat aacgggagga 300
aagagtacgt acaaacttcc gacagctccc gcggaggact ttcccgaatt tccagaaatc 360
gtagaaggag gagaaacact ttcgggaaac cttctcgtta acggaataga aaaggtagag 420
tacgccatag cgaaggaaga agcgaacata gcccttcagg gaatgtatct gagaggatac 480
gaggacagaa ttcactttgt gttcggacgg tcacaggctt gcactttatg aacctctacg 540
taaacattga aaagagtgaa gacgagtctt ttgcttactt ctccactccc gagtggaaac 600
tcgccgttag ctcctggaag gagaattccc ggactacatg agtgtcatcc ctgaggagtt 660
ttcggcggaa gtcttgtttg agacagagga agtcttaaag gttttaaaga ggttgaaggc 720
tttaagcgaa ggaaaagttt ttcccgtgaa gattacctta agcgaaaacc ttgccatctt 780
tgagttcgcg gatccggagt tcggagaagc gagagaggaa attgaagtgg agtacacggg 840
agagcccttt gagataggat tcaacggaaa taccttatgg aggcgcttga cgcctacgac 900
agcgaaagag tgtggttcaa gttcacaacc cccgacacgg ccactttatt ggaggctgaa 960
gattacgaaa aggaacctta caagtgcata ataatgccga tgagggtgta gccatgaaaa 1020
aagctttaat ctttttattg agcttgagcc ttttaattcc tgcgtttagc gaagccaaac 1080
ccaagtcttc                                                       1090
```

<210> 122
<211> 363
<212> PRT
<213> Aquifex aeolicus

<400> 122

```
Met Arg Val Lys Val Asp Arg Glu Glu Leu Glu Glu Val Leu Lys Lys
  1               5                  10                  15

Ala Arg Glu Ser Thr Glu Lys Lys Ala Ala Leu Pro Ile Leu Ala Asn
```

```
            20                  25                  30

Phe Leu Leu Ser Ala Lys Glu Glu Asn Leu Ile Val Arg Ala Thr Asp
         35                  40                  45

Leu Glu Asn Tyr Leu Val Val Ser Val Lys Gly Glu Val Glu Glu Glu
     50                  55                  60

Gly Glu Val Cys Val His Ser Gln Lys Leu Tyr Asp Ile Val Lys Asn
 65                  70                  75                  80

Leu Asn Ser Ala Tyr Val Tyr Leu His Thr Glu Gly Glu Lys Leu Val
                 85                  90                  95

Ile Thr Gly Gly Lys Ser Thr Tyr Lys Leu Pro Thr Ala Pro Ala Glu
            100                 105                 110

Asp Phe Pro Glu Phe Pro Glu Ile Val Glu Gly Gly Glu Thr Leu Ser
        115                 120                 125

Gly Asn Leu Leu Val Asn Gly Ile Glu Lys Val Glu Tyr Ala Ile Ala
    130                 135                 140

Lys Glu Glu Ala Asn Ile Ala Leu Gln Gly Met Tyr Leu Arg Gly Tyr
145                 150                 155                 160

Glu Asp Arg Ile His Phe Val Gly Ser Asp Gly His Arg Leu Ala Leu
                165                 170                 175

Tyr Glu Pro Leu Gly Glu Phe Ser Lys Glu Leu Leu Ile Pro Arg Lys
            180                 185                 190

Ser Leu Lys Val Leu Lys Lys Leu Ile Thr Gly Ile Glu Asp Val Asn
        195                 200                 205

Ile Glu Lys Ser Glu Asp Glu Ser Phe Ala Tyr Phe Ser Thr Pro Glu
    210                 215                 220

Trp Lys Leu Ala Val Arg Leu Leu Glu Gly Glu Phe Pro Asp Tyr Met
225                 230                 235                 240

Ser Val Ile Pro Glu Glu Phe Ser Ala Glu Val Leu Phe Glu Thr Glu
                245                 250                 255

Glu Val Leu Lys Val Leu Lys Arg Leu Lys Ala Leu Ser Glu Gly Lys
            260                 265                 270

Val Phe Pro Val Lys Ile Thr Leu Ser Glu Asn Leu Ala Ile Phe Glu
```

275 280 285

Phe Ala Asp Pro Glu Phe Gly Glu Ala Arg Glu Glu Ile Glu Val Glu
290 295 300

Tyr Thr Gly Glu Pro Phe Glu Ile Gly Phe Asn Gly Lys Tyr Leu Met
305 310 315 320

Glu Ala Leu Asp Ala Tyr Asp Ser Glu Arg Val Trp Phe Lys Phe Thr
325 330 335

Thr Pro Asp Thr Ala Thr Leu Leu Glu Ala Glu Asp Tyr Glu Lys Glu
340 345 350

Pro Tyr Lys Cys Ile Ile Met Pro Met Arg Val
355 360

<210> 123
<211> 1093
<212> DNA
<213> Aquifex aeolicus

<400> 123
gtggaaacca caatattcca gttccagaaa actttttca caaaacctcc gaaggagagg 60
gtcttcgtcc ttcatggaga agagcagtat ctcataagaa ccttttgtc taagctgaag 120
gaaaagtacg gggagaatta cacggttctg tgggggatg agataagcga ggaggaattc 180
tacactgccc tttccgagac cagtatattc ggcggttcaa aggaaaaagc ggtggtcatt 240
tacaacttcg gggatttcct gaagaagctc ggaaggaaga aaaaggaaaa agaaaggctt 300
ataaaagtcc tcagaaacgt aaagagtaac tacgtattta tagtgtacga tgcgaaactc 360
cagaaacagg aactttcttc ggaacctctg aaatccgtag cgtctttcgg cggtatagtg 420
gtagcaaaca ggctgagcaa ggagaggata aaacagctcg tccttaagaa gttcaaagaa 480
aaagggataa acgtagaaaa cgatgccctt gaataccttc tccagctcac gggttacaac 540
ttgatggagc tcaaacttga ggttgaaaaa ctgatagatt acgcaagtga aaagaaaatt 600
ttaacactcg atgaggtaaa gagagtagcc ttctcagtct cagaaaacgt aaacgtattt 660
gagttcgttg atttactcct cttaaaagat tacgaaaagg ctcttaaagt tttggactcc 720
ctcatttcct tcggaataca ccccctccag attatgaaaa tcctgtcctc ctatgctcta 780
aaactttaca ccctcaagag gcttgaagag aagggagagg acctgaataa ggcgatggaa 840
agcgtgggaa taaagaacaa ctttctcaag atgaagttca aatcttactt aaaggcaaac 900
tctaaagagg acttgaagaa cctaatcctc tccctccaga ggatagacgc tttttctaaa 960
ctttactttc aggacacagt gcagttgctg gggatttctt gacctcaaga ctggagaggg 1020
aagttgtgaa aaatacttct catggtggat aatctttttt atgaagtttg cggtttgcgt 1080
ttttcccggt tct 1093

<210> 124
<211> 350
<212> PRT

<213> Aquifex aeolicus

<400> 124

```
Val Glu Thr Thr Ile Phe Gln Phe Gln Lys Thr Phe Phe Thr Lys Pro
  1               5                  10                  15

Pro Lys Glu Arg Val Phe Val Leu His Gly Glu Glu Gln Tyr Leu Ile
             20                  25                  30

Arg Thr Phe Leu Ser Lys Leu Lys Glu Lys Tyr Gly Glu Asn Tyr Thr
         35                  40                  45

Val Leu Trp Gly Asp Glu Ile Ser Glu Glu Glu Phe Tyr Thr Ala Leu
     50                  55                  60

Ser Glu Thr Ser Ile Phe Gly Gly Ser Lys Glu Lys Ala Val Val Ile
 65                  70                  75                  80

Tyr Asn Phe Gly Asp Phe Leu Lys Lys Leu Gly Arg Lys Lys Lys Glu
                 85                  90                  95

Lys Glu Arg Leu Ile Lys Val Leu Arg Asn Val Lys Ser Asn Tyr Val
            100                 105                 110

Phe Ile Val Tyr Asp Ala Lys Leu Gln Lys Gln Glu Leu Ser Ser Glu
        115                 120                 125

Pro Leu Lys Ser Val Ala Ser Phe Gly Gly Ile Val Val Ala Asn Arg
    130                 135                 140

Leu Ser Lys Glu Arg Ile Lys Gln Leu Val Leu Lys Lys Phe Lys Glu
145                 150                 155                 160

Lys Gly Ile Asn Val Glu Asn Asp Ala Leu Glu Tyr Leu Leu Gln Leu
                165                 170                 175

Thr Gly Tyr Asn Leu Met Glu Leu Lys Leu Glu Val Glu Lys Leu Ile
            180                 185                 190

Asp Tyr Ala Ser Glu Lys Lys Ile Leu Thr Leu Asp Glu Val Lys Arg
        195                 200                 205

Val Ala Phe Ser Val Ser Glu Asn Val Asn Val Phe Glu Phe Val Asp
    210                 215                 220

Leu Leu Leu Leu Lys Asp Tyr Glu Lys Ala Leu Lys Val Leu Asp Ser
225                 230                 235                 240
```

```
Leu Ile Ser Phe Gly Ile His Pro Leu Gln Ile Met Lys Ile Leu Ser
                245                 250                 255

Ser Tyr Ala Leu Lys Leu Tyr Thr Leu Lys Arg Leu Glu Glu Lys Gly
            260                 265                 270

Glu Asp Leu Asn Lys Ala Met Glu Ser Val Gly Ile Lys Asn Asn Phe
        275                 280                 285

Leu Lys Met Lys Phe Lys Ser Tyr Leu Lys Ala Asn Ser Lys Glu Asp
    290                 295                 300

Leu Lys Asn Leu Ile Leu Ser Leu Gln Arg Ile Asp Ala Phe Ser Lys
305                 310                 315                 320

Leu Tyr Phe Gln Asp Thr Val Gln Leu Leu Arg Asp Phe Leu Thr Ser
                325                 330                 335

Arg Leu Glu Arg Glu Val Val Lys Asn Thr Ser His Gly Gly
            340                 345                 350
```

<210> 125
<211> 1051
<212> DNA
<213> Aquifex aeolicus

<400> 125

```
atggaaaaag ttttttgga aaaactccag aaaaccttgc acatacccgg aggactcctt 60
ttttacggca aagaaggaag cggaaagacg aaaacagctt ttgaatttgc aaaaggtatt 120
ttatgtaagg aaaacgtacc tggggatgcg gaagttgtcc ctcctgcaaa cacgtaaacg 180
agctggagga agccttcttt aaaggagaaa tagaagactt taaagtttat aagacaagga 240
cggtaaaaag cacttcgttt accttatggg cgaacatccc gactttgtgg taataatccc 300
gagcggacat tacataaaga tagaacagat aagggaagtt aagaactttg cctatgtgaa 360
gcccgcacta agcaggagaa aagtaattat aatagacgac gcccacgcga tgacctctca 420
ggcggcaaac gctcttttaa aggtattgga agagccacct gcggacacca cctttatctt 480
gaccacgaac aggcgttctg caatcctgcc gactatcctc tccagaactt ttcaagtgga 540
gttcaagggc ttttcagtaa aagaggttat ggaaatagcg aaagtagacg aggaaatagc 600
gaaactctct ggaggcagtc taaaaagggc tatcttacta aaggaaaaca aagatatcct 660
aaacaaagta aaggaattct tggaaaacga gccgttaaaa gtttacaagc ttgcaagtga 720
attcgaaaag tgggaacctg aaaagcaaaa actcttcctt gaaattatgg aagaattggt 780
atctcaaaaa ttgaccgaag agaaaaaaga caattacacc taccttcttg atacgatcag 840
actctttaaa gacggactcg caaggggtgt aaacgaacct ctgtggctgt ttacgttagc 900
cgttcaggcg gattaataaa ccgttattga ttccgtaaca tttaaacctt aatctaaatt 960
atgagagcct ttgaaggagg tctggtatgg aaaatttgaa gattagatat atagatacga 1020
ggaagatagg aaccgtgagc ggtgtaaaag t                                1051
```

<210> 126
<211> 305
<212> PRT
<213> Aquifex aeolicus

<400> 126
Met Glu Lys Val Phe Leu Glu Lys Leu Gln Lys Thr Leu His Ile Pro
1 5 10 15

Gly Gly Leu Leu Phe Tyr Gly Lys Glu Gly Ser Gly Lys Thr Lys Thr
20 25 30

Ala Phe Glu Phe Ala Lys Gly Ile Leu Cys Lys Glu Asn Val Pro Trp
35 40 45

Gly Cys Gly Ser Cys Pro Ser Cys Lys His Val Asn Glu Leu Glu Glu
50 55 60

Ala Phe Phe Lys Gly Glu Ile Glu Asp Phe Lys Val Tyr Lys Asp Lys
65 70 75 80

Asp Gly Lys Lys His Phe Val Tyr Leu Met Gly Glu His Pro Asp Phe
85 90 95

Val Val Ile Ile Pro Ser Gly His Tyr Ile Lys Ile Glu Gln Ile Arg
100 105 110

Glu Val Lys Asn Phe Ala Tyr Val Lys Pro Ala Leu Ser Arg Arg Lys
115 120 125

Val Ile Ile Ile Asp Asp Ala His Ala Met Thr Ser Gln Ala Ala Asn
130 135 140

Ala Leu Leu Lys Val Leu Glu Glu Pro Pro Ala Asp Thr Thr Phe Ile
145 150 155 160

Leu Thr Thr Asn Arg Arg Ser Ala Ile Leu Pro Thr Ile Leu Ser Arg
165 170 175

Thr Phe Gln Val Glu Phe Lys Gly Phe Ser Val Lys Glu Val Met Glu
180 185 190

Ile Ala Lys Val Asp Glu Glu Ile Ala Lys Leu Ser Gly Gly Ser Leu
195 200 205

Lys Arg Ala Ile Leu Leu Lys Glu Asn Lys Asp Ile Leu Asn Lys Val
210 215 220

```
Lys Glu Phe Leu Glu Asn Glu Pro Leu Lys Val Tyr Lys Leu Ala Ser
225                 230                 235                 240

Glu Phe Glu Lys Trp Glu Pro Glu Lys Gln Lys Leu Phe Leu Glu Ile
                245                 250                 255

Met Glu Glu Leu Val Ser Gln Lys Leu Thr Glu Glu Lys Lys Asp Asn
            260                 265                 270

Tyr Thr Tyr Leu Leu Asp Thr Ile Arg Leu Phe Lys Asp Gly Leu Ala
        275                 280                 285

Arg Gly Val Asn Glu Pro Leu Trp Leu Phe Thr Leu Ala Val Gln Ala
    290                 295                 300

Asp
305
```

<210> 127
<211> 630
<212> DNA
<213> Aquifex aeolicus

<400> 127
atgaacttcc tgaaaaagtt ccttttactg agaaaagctc aaaagtctcc ttacttcgaa 60
gagttctacg aagaaatcga tttgaaccag aaggtgaaag atgcaaggtt tgtagttttt 120
gactgcgaag ccacagaact cgacgtaaag aaggcaaaac tcctttcaat aggtgcggtt 180
gaggttaaaa acctggaaat agacctctct aaatcttttt acgagatact caaaagtgac 240
gagataaagg cggcggagat acatggaata accagggaag acgttgaaaa gtacggaaag 300
gaaccaaagg aagtaatata cgactttctg aagtacataa agggaagcgt tctcgttggc 360
tactacgtga agtttgacgt ctcactcgtt gagaagtact ccataaagta cttccagtat 420
ccaatcatca actacaagtt agacctgttt agtttcgtga agagagagta ccagagtggc 480
aggagtcttg acgaccttat gaaggaactc ggtgtagaaa taagggcaag gcacaacgcc 540
cttgaagatg cctacataac cgctcttctt ttcctaaagt acgtttaccc gaacagggag 600
tacagactaa aggatctccc gattttcctt   630

<210> 128
<211> 210
<212> PRT
<213> Aquifex aeolicus

<400> 128
```
Met Asn Phe Leu Lys Lys Phe Leu Leu Leu Arg Lys Ala Gln Lys Ser
  1               5                  10                  15

Pro Tyr Phe Glu Glu Phe Tyr Glu Glu Ile Asp Leu Asn Gln Lys Val
```

```
            20                  25                  30

Lys Asp Ala Arg Phe Val Val Phe Asp Cys Glu Ala Thr Glu Leu Asp
         35                  40                  45

Val Lys Lys Ala Lys Leu Leu Ser Ile Gly Ala Val Glu Val Lys Asn
     50                  55                  60

Leu Glu Ile Asp Leu Ser Lys Ser Phe Tyr Glu Ile Leu Lys Ser Asp
 65                  70                  75                  80

Glu Ile Lys Ala Ala Glu Ile His Gly Ile Thr Arg Glu Asp Val Glu
                 85                  90                  95

Lys Tyr Gly Lys Glu Pro Lys Glu Val Ile Tyr Asp Phe Leu Lys Tyr
            100                 105                 110

Ile Lys Gly Ser Val Leu Val Gly Tyr Tyr Val Lys Phe Asp Val Ser
        115                 120                 125

Leu Val Glu Lys Tyr Ser Ile Lys Tyr Phe Gln Tyr Pro Ile Ile Asn
    130                 135                 140

Tyr Lys Leu Asp Leu Phe Ser Phe Val Lys Arg Glu Tyr Gln Ser Gly
145                 150                 155                 160

Arg Ser Leu Asp Asp Leu Met Lys Glu Leu Gly Val Glu Ile Arg Ala
                165                 170                 175

Arg His Asn Ala Leu Glu Asp Ala Tyr Ile Thr Ala Leu Leu Phe Leu
            180                 185                 190

Lys Tyr Val Tyr Pro Asn Arg Glu Tyr Arg Leu Lys Asp Leu Pro Ile
        195                 200                 205

Phe Leu
    210
```

<210> 129
<211> 526
<212> DNA
<213> Aquifex aeolicus

<400> 129
atgctcaata aggtttttat aataggaaga cttacgggtg accccgttat aacttatcta 60
ccgagcggaa cgcccgtagt agagtttact ctggcttaca acagaaggta taaaaaccag 120
aacggtgaat ttcaggagga aagtcacttc tttgacgtaa aggcgtacgg aaaaatggct 180

gaagactggg ctacacgctt ctcgaaagga tacctcgtac tcgtagaggg aagactctcc 240
caggaaaagt gggagaaaga aggaaagaag ttctcaaagg tcaggataat agcggaaaac 300
gtaagattaa taaacaggcc gaaaggtgct gaacttcaag cagaagaaga ggaggaagtt 360
cctcccattg aggaggaaat tgaaaaactc ggtaaagagg aagagaagcc ttttaccgat 420
gaagaggacg aaataccttt ttaattttga ggaggttaaa gtatggtagt gagagctcct 480
aagaagaaag tttgtatgta ctgtgaacaa aagagagagc cagatt 526

<210> 130
<211> 147
<212> PRT
<213> Aquifex aeolicus

<400> 130
Met Leu Asn Lys Val Phe Ile Ile Gly Arg Leu Thr Gly Asp Pro Val
1 5 10 15

Ile Thr Tyr Leu Pro Ser Gly Thr Pro Val Val Glu Phe Thr Leu Ala
20 25 30

Tyr Asn Arg Arg Tyr Lys Asn Gln Asn Gly Glu Phe Gln Glu Glu Ser
35 40 45

His Phe Phe Asp Val Lys Ala Tyr Gly Lys Met Ala Glu Asp Trp Ala
50 55 60

Thr Arg Phe Ser Lys Gly Tyr Leu Val Leu Val Glu Gly Arg Leu Ser
65 70 75 80

Gln Glu Lys Trp Glu Lys Glu Gly Lys Lys Phe Ser Lys Val Arg Ile
85 90 95

Ile Ala Glu Asn Val Arg Leu Ile Asn Arg Pro Lys Gly Ala Glu Leu
100 105 110

Gln Ala Glu Glu Glu Glu Glu Val Pro Pro Ile Glu Glu Glu Ile Glu
115 120 125

Lys Leu Gly Lys Glu Glu Glu Lys Pro Phe Thr Asp Glu Glu Asp Glu
130 135 140

Ile Pro Phe
145

<210> 131
<211> 1472
<212> DNA

<213> Aquifex aeolicus

<400> 131
atgcaatttg tggataaact tccctgtgac gaatccgccg agagggcggt tcttggcagt 60
atgcttgaag accccgaaaa catacctctg gtacttgaat accttaaaga agaagacttc 120
tgcatagacg agcacaagct acttttcagg gttcttacaa acctctggtc cgagtacggc 180
aataagctcg atttcgtatt aataaaggat caccttgaaa agaaaaactt actccagaaa 240
atacctatag actggctcga agaactctac gaggaggcgg tatcccctga cacgcttgag 300
gaagtctgca aaatagtaaa acaacgttcc gcacagaggg cgataattca actcggtata 360
gaactcattc acaaaggaaa ggaaaacaaa gactttcaca cattaatcga ggaagcccag 420
agcaggatat tttccatagc ggaaagtgct acatctacgc agttttacca tgtgaaagac 480
gttgcggaag aagttataga actcatttat aaattcaaaa gctctgacag gctagtcacg 540
ggactcccaa gcggtttcac ggaactcgat ctaaagacga cgggattcca ccctggagac 600
ttaataatac tcgccgcaag acccggtatg gggaaaaccg cctttatgct ctccataatc 660
tacaatctcg caaaagacga gggaaaaccc tcagctgtat tttccttgga aatgagcaag 720
gaacagctcg ttatgagact cctctctatg atgtcggagg tcccactttt caagataagg 780
tctggaagta tatcgaatga agatttaaag aagcttgaag caagcgcaat agaactcgca 840
aagtacgaca tatacctcga cgacacaccc gctctcacta caacggattt aaggataagg 900
gcaagaaagc tcagaaagga aaaggaagtt gagttcgtgg cggtggacta cttgcaactt 960
ctgagaccgc cagtccgaaa gagttcaaga caggaggaag tggcagaggt ttcaagaaac 1020
ttaaaagccc ttgcaaagga acttcacatt cccgttatgg cacttgcgca gctctcccgt 1080
gaggtggaaa agaggagtga taaaagaccc cagcttgcgg acctcagaga atccggacag 1140
atagaacagg acgcagacct aatccttttc ctccacagac ccgagtacta caagaaaaag 1200
ccaaatcccg aagagcaggg tatagcggaa gtgataatag ccaagcaaag gcaaggaccc 1260
acggacattg tgaagctcgc atttattaag gagtacacta agtttgcaaa cctagaagcc 1320
cttcctgaac aacctcctga agaagaggaa ctttccgaaa ttattgaaac acaggaggat 1380
gaaggattcg aagatattga cttctgaaaa ttaaggtttt ataattttat cttggctatc 1440
cggggtagct caatcggcag agcgggtggc tg 1472

<210> 132
<211> 438
<212> PRT
<213> Aquifex aeolicus

<400> 132
Met Gln Phe Val Asp Lys Leu Pro Cys Asp Glu Ser Ala Glu Arg Ala
1 5 10 15

Val Leu Gly Ser Met Leu Glu Asp Pro Glu Asn Ile Pro Leu Val Leu
20 25 30

Glu Tyr Leu Lys Glu Glu Asp Phe Cys Ile Asp Glu His Lys Leu Leu
35 40 45

Phe Arg Val Leu Thr Asn Leu Trp Ser Glu Tyr Gly Asn Lys Leu Asp
50 55 60

```
Phe Val Leu Ile Lys Asp His Leu Glu Lys Lys Asn Leu Leu Gln Lys
 65                  70                  75                  80

Ile Pro Ile Asp Trp Leu Glu Glu Leu Tyr Glu Glu Ala Val Ser Pro
                85                  90                  95

Asp Thr Leu Glu Glu Val Cys Lys Ile Val Lys Gln Arg Ser Ala Gln
            100                 105                 110

Arg Ala Ile Ile Gln Leu Gly Ile Thr Ser Thr Gln Phe Tyr His Val
        115                 120                 125

Lys Asp Val Ala Glu Glu Val Ile Glu Leu Ile Tyr Lys Phe Lys Ser
    130                 135                 140

Ser Asp Arg Leu Val Thr Gly Leu Pro Ser Gly Phe Thr Glu Leu Asp
145                 150                 155                 160

Leu Lys Thr Thr Gly Phe His Pro Gly Asp Leu Ile Ile Leu Ala Ala
                165                 170                 175

Arg Pro Gly Met Gly Lys Thr Ala Phe Met Leu Ser Ile Ile Tyr Asn
            180                 185                 190

Leu Ala Lys Asp Glu Gly Lys Pro Ser Ala Val Phe Ser Leu Glu Met
        195                 200                 205

Ser Lys Glu Gln Leu Val Met Arg Leu Leu Ser Met Met Ser Glu Val
    210                 215                 220

Pro Leu Phe Lys Ile Arg Ser Gly Ser Ile Ser Asn Glu Asp Leu Lys
225                 230                 235                 240

Lys Leu Glu Ala Ser Ala Ile Glu Leu Ala Lys Tyr Asp Ile Tyr Leu
                245                 250                 255

Asp Asp Thr Pro Ala Leu Thr Thr Thr Asp Leu Arg Ile Arg Ala Arg
            260                 265                 270

Lys Leu Arg Lys Glu Lys Glu Val Glu Phe Val Ala Val Asp Tyr Leu
        275                 280                 285

Gln Leu Leu Arg Pro Pro Val Arg Lys Ser Ser Arg Gln Glu Glu Val
    290                 295                 300

Ala Glu Val Ser Arg Asn Leu Lys Ala Leu Ala Lys Glu Leu His Ile
305                 310                 315                 320
```

```
Pro Val Met Ala Leu Ala Gln Leu Ser Arg Glu Val Glu Lys Arg Ser
                325                 330                 335

Asp Lys Arg Pro Gln Leu Ala Asp Leu Arg Glu Ser Gly Gln Ile Glu
            340                 345                 350

Gln Asp Ala Asp Leu Ile Leu Phe Leu His Arg Pro Glu Tyr Tyr Lys
        355                 360                 365

Lys Lys Pro Asn Pro Glu Glu Gln Gly Ile Ala Glu Val Ile Ile Ala
    370                 375                 380

Lys Gln Arg Gln Gly Pro Thr Asp Ile Val Lys Leu Ala Phe Ile Lys
385                 390                 395                 400

Glu Tyr Thr Lys Phe Ala Asn Leu Glu Ala Leu Pro Glu Gln Pro Pro
                405                 410                 415

Glu Glu Glu Glu Leu Ser Glu Ile Ile Glu Thr Gln Glu Asp Glu Gly
            420                 425                 430

Phe Glu Asp Ile Asp Phe
        435
```

<210> 133
<211> 1526
<212> DNA
<213> Aquifex aeolicus

<400> 133
atgtcctcgg acatagacga acttagacgg gaaatagata tagtagacgt catttccgaa 60
tacttaaact tagagaaggt aggttccaat tacagaacga actgtccctt tcaccctgac 120
gatacaccct ccttttacgt gtctccaagt aaacaaatat tcaagtgttt cggttgcggg 180
gtaggggggag acgcgataaa gttcgtttcc ctttacgagg acatctccta ttttgaagcc 240
gcccttgaac tcgcaaaacg ctacggaaag aaattagacc ttgaaaagat atcaaaagac 300
gaaaaggtat acgtggctct tgacagggtt tgtgatttct acagggaaag ccttctcaaa 360
aacagagagg caagtgagta cgtaaagagt aggggaatag accctaaagt agcgaggaag 420
tttgatcttg ggtacgcacc ttccagtgaa gcactcgtaa aagtcttaaa agagaacgat 480
cttttagagg cttaccttga aactaaaaac ctccttttctc ctacgaaggg tgtttacagg 540
gatctctttc ttcggcgtgt cgtgatcccg ataaaggatc cgaggggaag agttataggt 600
ttcggtggaa ggaggatagt agaggacaaa tctcccaagt acataaactc tccagacagc 660
agggtattta aaaaggggga gaacttattc ggtctttacg aggcaaagga gtatataaag 720
gaagaaggat ttgcgatact tgtggaaggg tactttgacc ttttgagact ttttccgag 780
ggaataagga acgttgttgc acccctcggt acagccctga cccaaaatca ggcaaacctc 840
ctttccaagt tcacaaaaaa ggtctacatc ctttacgacg gagatgatgc gggaagaaag 900
gctatgaaaa gtgccattcc cctactcctc agtgcaggag tggaagttta tcccgtttac 960
ctccccgaag gatacgatcc cgacgagttt ataaaggaat tcgggaaaga ggaattaaga 1020

agactgataa acagctcagg ggagctcttt gaaacgctca taaaaaccgc aagggaaaac 1080
ttagaggaga aaacgcgtga gttcaggtat tatctgggct ttatttccga tggagtaagg 1140
cgctttgctc tggcttcgga gtttcacacc aagtacaaag ttcctatgga aattttatta 1200
atgaaaattg aaaaaaattc tcaagaaaaa gaaattaaac tctcctttaa ggaaaaaatc 1260
ttcctgaaag gactgataga attaaaacca aaaatagacc ttgaagtcct gaacttaagt 1320
cctgagttaa aggaactcgc agttaacgcc ttaaacggag aggagcattt acttccaaaa 1380
gaagttctcg agtaccaggt ggataacttg gagaaacttt ttaacaacat ccttagggat 1440
ttacaaaaat ctgggaaaaa gaggaagaaa agagggttga aaaatgtaaa tacttaatta 1500
actttaataa atttttagag ttagga 1526

<210> 134
<211> 498
<212> PRT
<213> Aquifex aeolicus

<400> 134
Met Ser Ser Asp Ile Asp Glu Leu Arg Arg Glu Ile Asp Ile Val Asp
1 5 10 15

Val Ile Ser Glu Tyr Leu Asn Leu Glu Lys Val Gly Ser Asn Tyr Arg
20 25 30

Thr Asn Cys Pro Phe His Pro Asp Asp Thr Pro Ser Phe Tyr Val Ser
35 40 45

Pro Ser Lys Gln Ile Phe Lys Cys Phe Gly Cys Gly Val Gly Gly Asp
50 55 60

Ala Ile Lys Phe Val Ser Leu Tyr Glu Asp Ile Ser Tyr Phe Glu Ala
65 70 75 80

Ala Leu Glu Leu Ala Lys Arg Tyr Gly Lys Lys Leu Asp Leu Glu Lys
85 90 95

Ile Ser Lys Asp Glu Lys Val Tyr Val Ala Leu Asp Arg Val Cys Asp
100 105 110

Phe Tyr Arg Glu Ser Leu Leu Lys Asn Arg Glu Ala Ser Glu Tyr Val
115 120 125

Lys Ser Arg Gly Ile Asp Pro Lys Val Ala Arg Lys Phe Asp Leu Gly
130 135 140

Tyr Ala Pro Ser Ser Glu Ala Leu Val Lys Val Leu Lys Glu Asn Asp
145 150 155 160

Leu Leu Glu Ala Tyr Leu Glu Thr Lys Asn Leu Leu Ser Pro Thr Lys

```
                165                 170                 175

Gly Val Tyr Arg Asp Leu Phe Leu Arg Arg Val Val Ile Pro Ile Lys
            180                 185                 190

Asp Pro Arg Gly Arg Val Ile Gly Phe Gly Gly Arg Arg Ile Val Glu
        195                 200                 205

Asp Lys Ser Pro Lys Tyr Ile Asn Ser Pro Asp Ser Arg Val Phe Lys
    210                 215                 220

Lys Gly Glu Asn Leu Phe Gly Leu Tyr Glu Ala Lys Glu Tyr Ile Lys
225                 230                 235                 240

Glu Glu Gly Phe Ala Ile Leu Val Glu Gly Tyr Phe Asp Leu Leu Arg
                245                 250                 255

Leu Phe Ser Glu Gly Ile Arg Asn Val Val Ala Pro Leu Gly Thr Ala
            260                 265                 270

Leu Thr Gln Asn Gln Ala Asn Leu Leu Ser Lys Phe Thr Lys Lys Val
        275                 280                 285

Tyr Ile Leu Tyr Asp Gly Asp Asp Ala Gly Arg Lys Ala Met Lys Ser
    290                 295                 300

Ala Ile Pro Leu Leu Leu Ser Ala Gly Val Glu Val Tyr Pro Val Tyr
305                 310                 315                 320

Leu Pro Glu Gly Tyr Asp Pro Asp Glu Phe Ile Lys Glu Phe Gly Lys
                325                 330                 335

Glu Glu Leu Arg Arg Leu Ile Asn Ser Ser Gly Glu Leu Phe Glu Thr
            340                 345                 350

Leu Ile Lys Thr Ala Arg Glu Asn Leu Glu Glu Lys Thr Arg Glu Phe
        355                 360                 365

Arg Tyr Tyr Leu Gly Phe Ile Ser Asp Gly Val Arg Arg Phe Ala Leu
    370                 375                 380

Ala Ser Glu Phe His Thr Lys Tyr Lys Val Pro Met Glu Ile Leu Leu
385                 390                 395                 400

Met Lys Ile Glu Lys Asn Ser Gln Glu Lys Glu Ile Lys Leu Ser Phe
                405                 410                 415

Lys Glu Lys Ile Phe Leu Lys Gly Leu Ile Glu Leu Lys Pro Lys Ile
```

```
            420                 425                 430

Asp Leu Glu Val Leu Asn Leu Ser Pro Glu Leu Lys Glu Leu Ala Val
        435                 440                 445

Asn Ala Leu Asn Gly Glu Glu His Leu Leu Pro Lys Glu Val Leu Glu
    450                 455                 460

Tyr Gln Val Asp Asn Leu Glu Lys Leu Phe Asn Asn Ile Leu Arg Asp
465                 470                 475                 480

Leu Gln Lys Ser Gly Lys Lys Arg Lys Lys Arg Gly Leu Lys Asn Val
                485                 490                 495

Asn Thr
```

<210> 135
<211> 705
<212> DNA
<213> Aquifex aeolicus

<400> 135
atgcaagata ccgctacctg cagtatttgt caggggacgg gattcgtaaa gaccgaagac 60
aacaaggtaa ggctctgcga atgcaggttc aagaaaaggg atgtaaacag ggaactaaac 120
atcccaaaga ggtactggaa cgccaactta gacacttacc accccaagaa cgtatcccag 180
aacagggcac ttttgacgat aagggtcttc gtccacaact tcaatcccga ggaagggaaa 240
gggcttacct ttgtaggatc tcctggagtc ggcaaaactc accttgcggt tgcaacatta 300
aaagcgattt atgagaagaa gggaatcaga ggatacttct tcgatacgaa ggatctaata 360
ttcaggttaa aacacttaat ggacgaggga aaggatacaa agtttttaaa aactgtctta 420
aactcaccgg ttttggttct cgacgacctc ggttctgaga ggctcagtga ctggcagagg 480
gaactcatct cttacataat cacttacagg tataacaacc ttaagagcac gataataacc 540
acgaattact cactccagag ggaagaagag agtagcgtga ggataagtgc ggatcttgca 600
agcagactcg gagaaaacgt agtttcaaaa atttacgaga tgaacgagtt gctcgttata 660
aagggttccg acctcaggaa gtctaaaaag ctatcaaccc catct 705

<210> 136
<211> 235
<212> PRT
<213> Aquifex aeolicus

<400> 136
```
Met Gln Asp Thr Ala Thr Cys Ser Ile Cys Gln Gly Thr Gly Phe Val
  1               5                  10                  15

Lys Thr Glu Asp Asn Lys Val Arg Leu Cys Glu Cys Arg Phe Lys Lys
```

```
            20                  25                  30

Arg Asp Val Asn Arg Glu Leu Asn Ile Pro Lys Arg Tyr Trp Asn Ala
         35                  40                  45

Asn Leu Asp Thr Tyr His Pro Lys Asn Val Ser Gln Asn Arg Ala Leu
     50                  55                  60

Leu Thr Ile Arg Val Phe Val His Asn Phe Asn Pro Glu Glu Gly Lys
 65                  70                  75                  80

Gly Leu Thr Phe Val Gly Ser Pro Gly Val Gly Lys Thr His Leu Ala
                 85                  90                  95

Val Ala Thr Leu Lys Ala Ile Tyr Glu Lys Lys Gly Ile Arg Gly Tyr
            100                 105                 110

Phe Phe Asp Thr Lys Asp Leu Ile Phe Arg Leu Lys His Leu Met Asp
        115                 120                 125

Glu Gly Lys Asp Thr Lys Phe Leu Lys Thr Val Leu Asn Ser Pro Val
    130                 135                 140

Leu Val Leu Asp Asp Leu Gly Ser Glu Arg Leu Ser Asp Trp Gln Arg
145                 150                 155                 160

Glu Leu Ile Ser Tyr Ile Ile Thr Tyr Arg Tyr Asn Asn Leu Lys Ser
                165                 170                 175

Thr Ile Ile Thr Thr Asn Tyr Ser Leu Gln Arg Glu Glu Glu Ser Ser
            180                 185                 190

Val Arg Ile Ser Ala Asp Leu Ala Ser Arg Leu Gly Glu Asn Val Val
        195                 200                 205

Ser Lys Ile Tyr Glu Met Asn Glu Leu Leu Val Ile Lys Gly Ser Asp
    210                 215                 220

Leu Arg Lys Ser Lys Lys Leu Ser Thr Pro Ser
225                 230                 235
```

<210> 137
<211> 4101
<212> DNA
<213> Thermatoga maritima

<400> 137

atgaaaaaga ttgaaaattt gaagtggaaa aatgtctcgt ttaaaagcct ggaaatagat 60
cccgatgcag gtgtggttct cgtttccgtg gaaaaattct ccgaagagat agaagacctt 120
gtgcgtttac tggagaagaa gacgcggttt cgagtcatcg tgaacggtgt tcaaaaaagt 180
aacggggatc taaggggaaa gatactttcc cttctcaacg gtaatgtgcc ttacataaaa 240
gatgttgttt tcgaaggaaa caggctgatt ctgaaagtgc ttggagattt cgcgcgggac 300
aggatcgcct ccaaactcag aagcacgaaa aaacagctcg atgaactgct gcctcccgga 360
acagagatca tgctggaggt tgtggagcct ccggaagatc ttttgaaaaa ggaagtacca 420
caaccagaaa agagagaaga accaaagggt gaagaattga agatcgagga tgaaaaccac 480
atctttggac agaaacccag aaagatcgtc ttcacccccc caaaaatctt tgagtacaac 540
aaaaagacat cggtgaaggg caagatcttc aaaatagaga agatcgaggg gaaaagaacg 600
gtccttctga tttacctgac agacggagaa gattctctga tctgcaaagt cttcaacgac 660
gttgaaaagg tcgaagggaa agtatcggtg ggagacgtga tcgttgccac aggagacctc 720
cttctcgaaa acggggagcc cacccttttac gtgaagggaa tcacaaaact tcccgaagcg 780
aaaaggatgg acaaatctcc ggttaagagg gtggagctcc acgcccatac caagttcagc 840
gatcaggacg caataacaga tgtgaacgaa tatgtgaaac gagccaagga atggggcttt 900
cccgcgatag ccctcacgga tcatgggaac gttcaggcca taccttactt ctacgacgcg 960
gcgaaagaag ctggaataaa gcccattttc ggtatcgaag cgtatctggt gagtgacgtg 1020
gagcccgtca taaggaatct ctccgacgat tcgacgtttg gagatgccac gttcgtcgtc 1080
ctcgacttcg agacgacggg tctcgacccg caggtggatg agatcatcga gataggagcg 1140
gtgaagatac agggtggcca gatagtggac gagtaccaca ctctcataaa gccttccagg 1200
gagatctcaa gaaaaagttc ggagatcacc ggaatcactc aagagatgct ggaaaacaag 1260
agaagcatcg aggaagttct gccggagttc ctcggttttc tggaagattc catcatcgta 1320
gcacacaacg ccaacttcga ctacagattt ctgaggctgt ggatcaaaaa agtgatggga 1380
ttggactggg aaagacccta catagatacg ctcgccctcg caaagtccct tctcaaactg 1440
agaagctact ctctggattc cgttgtggaa aagctcggat tgggtccctt ccggcaccac 1500
agggccctgg atgacgcgag ggtcaccgct caggttttcc tcaggttcgt tgagatgatg 1560
aagaagatcg gtatcacgaa gctttcagaa atggagaagt tgaaggatac gatagactac 1620
accgcgttga aacccttcca ctgcacgatc ctcgttcaga acaaaaaggg attgaaaaac 1680
ctatacaaac tggtttctga ttcctatata aagtacttct acggtgttcc gaggatcctc 1740
aaaagtgagc tcatcgagaa cagagaagga ctgctcgtgg gtagcgcgtg tatctccggt 1800
gagctcggac gtgccgccct cgaaggagcg agtgattcag aactcgaaga gatcgcgaag 1860
ttctacgact acatagaagt catgccgctc gacgttatag ccgaagatga agaagaccta 1920
gacagagaaa gactgaaaga agtgtaccga aaactctaca gaatagcgaa aaaattgaac 1980
aagttcgtcg tcatgaccgg tgatgttcat ttcctcgatc ccgaagatgc caggggcaga 2040
gctgcacttc tggcacctca gggaaacaga aacttcgaga atcagcccgc actctacctc 2100
agaacgaccg aagaaatgct cgagaaggcg atagagatat tcgaagatga agagatcgcg 2160
agggaagtcg tgatagagaa tcccaacaga atagccgata tgatcgagga agtgcagccg 2220
ctcgagaaaa aacttcaccc gccgatcata gagaacgccg atgaaatagt gagaaacctc 2280
accatgaagc gggcgtacga gatctacggt gatccgcttc ccgaaatcgt ccagaagcgt 2340
gtggaaaagg aactgaacgc catcataaat catggatacg ccgttctcta tctcatcgct 2400
caggagctcg ttcagaaatc tatgagcgat ggttacgtgg ttggatccag aggatccgtc 2460
gggtcttcac tcgtggccaa tctcctcgga ataacagagg tgaatcccct accaccacat 2520
tacaggtgtc cagagtgcaa atactttgaa gttgtcgaag acgacagata cggagcgggt 2580
tacgaccttc ccaacaagaa ctgtccaaga tgtggggctc ctctcagaaa agacggccac 2640
ggcataccgt ttgaaacgtt catggggttc gagggtgaca aggtccccga catagatctc 2700
aacttctcag gagagtatca ggaacgtgct catcgttttg tggaagaact cttcggtaaa 2760
gaccacgtct atagggcggg aaccataaac accatcgcgg aaagaagtgc ggtgggttac 2820
gtgagaagct acgaagagaa aaccggaaag aagctcagaa aggcggaaat ggaaagactc 2880

gtttccatga tcacgggagt gaagagaacg acgggtcagc acccaggggg gctcatgatc 2940
ataccgaaag acaaagaagt ctacgatttc actcccatac agtatccagc caacgataga 3000
aacgcaggtg tgttcaccac gcacttcgca tacgagacga tccatgatga cctggtgaag 3060
atagatgcgc tcggccacga tgatcccact ttcatcaaga tgctcaagga cctcaccgga 3120
atcgatccca tgacgattcc catggatgac cccgatacgc tcgccatatt cagttctgtg 3180
aagcctcttg gtgtggatcc cgttgagctg gaaagcgatg tgggaacgta cggaattccg 3240
gagttcggaa ccgagtttgt gaggggaatg ctcgttgaaa cgagaccaaa gagtttcgcc 3300
gagcttgtga gaatctcagg actgtcacac ggtacggacg tctggttgaa caacgcacgt 3360
gattggataa acctcggcta cgccaagctc tccgaggtta tctcgtgtag ggacgacatc 3420
atgaacttcc tcatacacaa aggaatggaa ccgtcacttg ccttcaagat catggaaaac 3480
gtcaggaagg gaaagggtat cacagaagag atggagagcg agatgagaag gctgaaggtt 3540
ccagaatggt tcatcgaatc ctgtaaaagg atcaaatatc tcttcccgaa agctcacgct 3600
gtggcttacg tgagtatggc cttcagaatt gcttacttca aggttcacta tcctcttcag 3660
ttttacgcgg cgtacttcac gataaaaggt gatcagttcg atccggttct cgtactcagg 3720
ggaaaagaag ccataaagag gcgcttgaga gaactcaaag cgatgcctgc caaagacgcc 3780
cagaagaaaa acgaagtgag tgttctggag gttgccctgg aaatgatact gagaggtttt 3840
tccttcctac cgcccgacat cttcaaatcc gacgcgaaga aatttctgat agaaggaaac 3900
tcgctgagaa ttccgttcaa caaacttcca ggactgggtg acagcgttgc cgagtcgata 3960
atcagagcca gggaagaaaa gccgttcact tcggtggaag atctcatgaa gaggaccaag 4020
gtcaacaaaa atcacataga gctgatgaaa agcctgggtg ttctcgggga ccttccagag 4080
acggaacagt tcacgctttt c 4101

<210> 138
<211> 1367
<212> PRT
<213> Thermatoga maritima

<400> 138
Met Lys Lys Ile Glu Asn Leu Lys Trp Lys Asn Val Ser Phe Lys Ser
1 5 10 15

Leu Glu Ile Asp Pro Asp Ala Gly Val Val Leu Val Ser Val Glu Lys
20 25 30

Phe Ser Glu Glu Ile Glu Asp Leu Val Arg Leu Leu Glu Lys Lys Thr
35 40 45

Arg Phe Arg Val Ile Val Asn Gly Val Gln Lys Ser Asn Gly Asp Leu
50 55 60

Arg Gly Lys Ile Leu Ser Leu Leu Asn Gly Asn Val Pro Tyr Ile Lys
65 70 75 80

Asp Val Val Phe Glu Gly Asn Arg Leu Ile Leu Lys Val Leu Gly Asp
85 90 95

Phe Ala Arg Asp Arg Ile Ala Ser Lys Leu Arg Ser Thr Lys Lys Gln

100 105 110

Leu Asp Glu Leu Leu Pro Pro Gly Thr Glu Ile Met Leu Glu Val Val
115 120 125

Glu Pro Pro Glu Asp Leu Leu Lys Lys Glu Val Pro Gln Pro Glu Lys
130 135 140

Arg Glu Glu Pro Lys Gly Glu Glu Leu Lys Ile Glu Asp Glu Asn His
145 150 155 160

Ile Phe Gly Gln Lys Pro Arg Lys Ile Val Phe Thr Pro Ser Lys Ile
165 170 175

Phe Glu Tyr Asn Lys Lys Thr Ser Val Lys Gly Lys Ile Phe Lys Ile
180 185 190

Glu Lys Ile Glu Gly Lys Arg Thr Val Leu Leu Ile Tyr Leu Thr Asp
195 200 205

Gly Glu Asp Ser Leu Ile Cys Lys Val Phe Asn Asp Val Glu Lys Val
210 215 220

Glu Gly Lys Val Ser Val Gly Asp Val Ile Val Ala Thr Gly Asp Leu
225 230 235 240

Leu Leu Glu Asn Gly Glu Pro Thr Leu Tyr Val Lys Gly Ile Thr Lys
245 250 255

Leu Pro Glu Ala Lys Arg Met Asp Lys Ser Pro Val Lys Arg Val Glu
260 265 270

Leu His Ala His Thr Lys Phe Ser Asp Gln Asp Ala Ile Thr Asp Val
275 280 285

Asn Glu Tyr Val Lys Arg Ala Lys Glu Trp Gly Phe Pro Ala Ile Ala
290 295 300

Leu Thr Asp His Gly Asn Val Gln Ala Ile Pro Tyr Phe Tyr Asp Ala
305 310 315 320

Ala Lys Glu Ala Gly Ile Lys Pro Ile Phe Gly Ile Glu Ala Tyr Leu
325 330 335

Val Ser Asp Val Glu Pro Val Ile Arg Asn Leu Ser Asp Asp Ser Thr
340 345 350

Phe Gly Asp Ala Thr Phe Val Val Leu Asp Phe Glu Thr Thr Gly Leu

```
        355                 360                 365

Asp Pro Gln Val Asp Glu Ile Ile Glu Ile Gly Ala Val Lys Ile Gln
    370                 375                 380

Gly Gly Gln Ile Val Asp Glu Tyr His Thr Leu Ile Lys Pro Ser Arg
385                 390                 395                 400

Glu Ile Ser Arg Lys Ser Ser Glu Ile Thr Gly Ile Thr Gln Glu Met
                405                 410                 415

Leu Glu Asn Lys Arg Ser Ile Glu Glu Val Leu Pro Glu Phe Leu Gly
            420                 425                 430

Phe Leu Glu Asp Ser Ile Ile Val Ala His Asn Ala Asn Phe Asp Tyr
        435                 440                 445

Arg Phe Leu Arg Leu Trp Ile Lys Lys Val Met Gly Leu Asp Trp Glu
    450                 455                 460

Arg Pro Tyr Ile Asp Thr Leu Ala Leu Ala Lys Ser Leu Leu Lys Leu
465                 470                 475                 480

Arg Ser Tyr Ser Leu Asp Ser Val Val Glu Lys Leu Gly Leu Gly Pro
                485                 490                 495

Phe Arg His His Arg Ala Leu Asp Asp Ala Arg Val Thr Ala Gln Val
            500                 505                 510

Phe Leu Arg Phe Val Glu Met Met Lys Lys Ile Gly Ile Thr Lys Leu
        515                 520                 525

Ser Glu Met Glu Lys Leu Lys Asp Thr Ile Asp Tyr Thr Ala Leu Lys
    530                 535                 540

Pro Phe His Cys Thr Ile Leu Val Gln Asn Lys Lys Gly Leu Lys Asn
545                 550                 555                 560

Leu Tyr Lys Leu Val Ser Asp Ser Tyr Ile Lys Tyr Phe Tyr Gly Val
                565                 570                 575

Pro Arg Ile Leu Lys Ser Glu Leu Ile Glu Asn Arg Glu Gly Leu Leu
            580                 585                 590

Val Gly Ser Ala Cys Ile Ser Gly Glu Leu Gly Arg Ala Ala Leu Glu
        595                 600                 605

Gly Ala Ser Asp Ser Glu Leu Glu Glu Ile Ala Lys Phe Tyr Asp Tyr
```

610 615 620

Ile Glu Val Met Pro Leu Asp Val Ile Ala Glu Asp Glu Glu Asp Leu
625 630 635 640

Asp Arg Glu Arg Leu Lys Glu Val Tyr Arg Lys Leu Tyr Arg Ile Ala
645 650 655

Lys Lys Leu Asn Lys Phe Val Val Met Thr Gly Asp Val His Phe Leu
660 665 670

Asp Pro Glu Asp Ala Arg Gly Arg Ala Ala Leu Leu Ala Pro Gln Gly
675 680 685

Asn Arg Asn Phe Glu Asn Gln Pro Ala Leu Tyr Leu Arg Thr Thr Glu
690 695 700

Glu Met Leu Glu Lys Ala Ile Glu Ile Phe Glu Asp Glu Glu Ile Ala
705 710 715 720

Arg Glu Val Val Ile Glu Asn Pro Asn Arg Ile Ala Asp Met Ile Glu
725 730 735

Glu Val Gln Pro Leu Glu Lys Lys Leu His Pro Pro Ile Ile Glu Asn
740 745 750

Ala Asp Glu Ile Val Arg Asn Leu Thr Met Lys Arg Ala Tyr Glu Ile
755 760 765

Tyr Gly Asp Pro Leu Pro Glu Ile Val Gln Lys Arg Val Glu Lys Glu
770 775 780

Leu Asn Ala Ile Ile Asn His Gly Tyr Ala Val Leu Tyr Leu Ile Ala
785 790 795 800

Gln Glu Leu Val Gln Lys Ser Met Ser Asp Gly Tyr Val Val Gly Ser
805 810 815

Arg Gly Ser Val Gly Ser Ser Leu Val Ala Asn Leu Leu Gly Ile Thr
820 825 830

Glu Val Asn Pro Leu Pro Pro His Tyr Arg Cys Pro Glu Cys Lys Tyr
835 840 845

Phe Glu Val Val Glu Asp Asp Arg Tyr Gly Ala Gly Tyr Asp Leu Pro
850 855 860

Asn Lys Asn Cys Pro Arg Cys Gly Ala Pro Leu Arg Lys Asp Gly His

865 870 875 880

Gly Ile Pro Phe Glu Thr Phe Met Gly Phe Glu Gly Asp Lys Val Pro
885 890 895

Asp Ile Asp Leu Asn Phe Ser Gly Glu Tyr Gln Glu Arg Ala His Arg
900 905 910

Phe Val Glu Glu Leu Phe Gly Lys Asp His Val Tyr Arg Ala Gly Thr
915 920 925

Ile Asn Thr Ile Ala Glu Arg Ser Ala Val Gly Tyr Val Arg Ser Tyr
930 935 940

Glu Glu Lys Thr Gly Lys Lys Leu Arg Lys Ala Glu Met Glu Arg Leu
945 950 955 960

Val Ser Met Ile Thr Gly Val Lys Arg Thr Thr Gly Gln His Pro Gly
965 970 975

Gly Leu Met Ile Ile Pro Lys Asp Lys Glu Val Tyr Asp Phe Thr Pro
980 985 990

Ile Gln Tyr Pro Ala Asn Asp Arg Asn Ala Gly Val Phe Thr Thr His
995 1000 1005

Phe Ala Tyr Glu Thr Ile His Asp Asp Leu Val Lys Ile Asp Ala Leu
1010 1015 1020

Gly His Asp Asp Pro Thr Phe Ile Lys Met Leu Lys Asp Leu Thr Gly
1025 1030 1035 1040

Ile Asp Pro Met Thr Ile Pro Met Asp Asp Pro Asp Thr Leu Ala Ile
1045 1050 1055

Phe Ser Ser Val Lys Pro Leu Gly Val Asp Pro Val Glu Leu Glu Ser
1060 1065 1070

Asp Val Gly Thr Tyr Gly Ile Pro Glu Phe Gly Thr Glu Phe Val Arg
1075 1080 1085

Gly Met Leu Val Glu Thr Arg Pro Lys Ser Phe Ala Glu Leu Val Arg
1090 1095 1100

Ile Ser Gly Leu Ser His Gly Thr Asp Val Trp Leu Asn Asn Ala Arg
1105 1110 1115 1120

Asp Trp Ile Asn Leu Gly Tyr Ala Lys Leu Ser Glu Val Ile Ser Cys

1125 1130 1135

Arg Asp Asp Ile Met Asn Phe Leu Ile His Lys Gly Met Glu Pro Ser
1140 1145 1150

Leu Ala Phe Lys Ile Met Glu Asn Val Arg Lys Gly Lys Gly Ile Thr
1155 1160 1165

Glu Glu Met Glu Ser Glu Met Arg Arg Leu Lys Val Pro Glu Trp Phe
1170 1175 1180

Ile Glu Ser Cys Lys Arg Ile Lys Tyr Leu Phe Pro Lys Ala His Ala
1185 1190 1195 1200

Val Ala Tyr Val Ser Met Ala Phe Arg Ile Ala Tyr Phe Lys Val His
1205 1210 1215

Tyr Pro Leu Gln Phe Tyr Ala Ala Tyr Phe Thr Ile Lys Gly Asp Gln
1220 1225 1230

Phe Asp Pro Val Leu Val Leu Arg Gly Lys Glu Ala Ile Lys Arg Arg
1235 1240 1245

Leu Arg Glu Leu Lys Ala Met Pro Ala Lys Asp Ala Gln Lys Lys Asn
1250 1255 1260

Glu Val Ser Val Leu Glu Val Ala Leu Glu Met Ile Leu Arg Gly Phe
1265 1270 1275 1280

Ser Phe Leu Pro Pro Asp Ile Phe Lys Ser Asp Ala Lys Lys Phe Leu
1285 1290 1295

Ile Glu Gly Asn Ser Leu Arg Ile Pro Phe Asn Lys Leu Pro Gly Leu
1300 1305 1310

Gly Asp Ser Val Ala Glu Ser Ile Ile Arg Ala Arg Glu Glu Lys Pro
1315 1320 1325

Phe Thr Ser Val Glu Asp Leu Met Lys Arg Thr Lys Val Asn Lys Asn
1330 1335 1340

His Ile Glu Leu Met Lys Ser Leu Gly Val Leu Gly Asp Leu Pro Glu
1345 1350 1355 1360

Thr Glu Gln Phe Thr Leu Phe
1365

<210> 139
<211> 567
<212> DNA
<213> Thermatoga maritima

<400> 139
gtgctcgcca tgatatggaa cgacaccgtt ttttgcgtcg tagacacaga aaccacggga 60
accgatccct ttgccggaga ccggatagtt gaaatagccg ctgttcctgt cttcaagggg 120
aagatctaca gaaacaaagc gtttcactct ctcgtgaatc ccagaataag aatccctgcg 180
ctgattcaga aagttcacgg tatcagcaac atggacatcg tggaagcgcc agacatggac 240
acagtttacg atcttttcag ggattacgtg aagggaacgg tgctcgtgtt tcacaacgcc 300
aacttcgacc tcacttttct ggatatgatg gcaaaggaaa cgggaaactt tccaataacg 360
aatccctaca tcgacacact cgatctttca gaagagatct ttggaaggcc tcattctctc 420
aaatggctct ccgaaagact tggaataaaa accacgatac ggcaccgtgc tcttccagat 480
gccctggtga ccgcaagagt ttttgtgaag cttgttgaat ttcttggtga aaacagggtc 540
aacgaattca tacgtggaaa acggggg 567

<210> 140
<211> 189
<212> PRT
<213> Thermatoga maritima

<400> 140
Met Leu Ala Met Ile Trp Asn Asp Thr Val Phe Cys Val Val Asp Thr
1 5 10 15

Glu Thr Thr Gly Thr Asp Pro Phe Ala Gly Asp Arg Ile Val Glu Ile
20 25 30

Ala Ala Val Pro Val Phe Lys Gly Lys Ile Tyr Arg Asn Lys Ala Phe
35 40 45

His Ser Leu Val Asn Pro Arg Ile Arg Ile Pro Ala Leu Ile Gln Lys
50 55 60

Val His Gly Ile Ser Asn Met Asp Ile Val Glu Ala Pro Asp Met Asp
65 70 75 80

Thr Val Tyr Asp Leu Phe Arg Asp Tyr Val Lys Gly Thr Val Leu Val
85 90 95

Phe His Asn Ala Asn Phe Asp Leu Thr Phe Leu Asp Met Met Ala Lys
100 105 110

Glu Thr Gly Asn Phe Pro Ile Thr Asn Pro Tyr Ile Asp Thr Leu Asp
115 120 125

```
Leu Ser Glu Glu Ile Phe Gly Arg Pro His Ser Leu Lys Trp Leu Ser
    130                 135                 140

Glu Arg Leu Gly Ile Lys Thr Thr Ile Arg His Arg Ala Leu Pro Asp
145                 150                 155                 160

Ala Leu Val Thr Ala Arg Val Phe Val Lys Leu Val Glu Phe Leu Gly
                165                 170                 175

Glu Asn Arg Val Asn Glu Phe Ile Arg Gly Lys Arg Gly
            180                 185
```

<210> 141
<211> 1434
<212> DNA
<213> Thermatoga maritima

<400> 141
gtggaagttc tttacaggaa gtacaggcca aagacttttt ctgaggttgt caatcaggat 60
catgtgaaga aggcaataat cggtgctatt cagaagaaca gcgtggccca cggatacata 120
ttcgccggtc cgaggggaac ggggaagact actcttgcca gaattctcgc aaaatccctg 180
aactgtgaga acagaaaggg agttgaaccc tgcaattcct gcagagcctg cagagagata 240
gacgagggaa ccttcatgga cgtgatagag ctcgacgcgg cctccaacag aggaatagac 300
gagatcagaa gaatcagaga cgccgttgga tacaggccga tggaaggtaa atacaaagtc 360
tacataatag acgaagttca catgctcacg aaagaagcct tcaacgcgct cctcaaaaca 420
ctcgaagaac ctccttccca cgtcgtgttc gtgctggcaa cgacaaacct tgagaaggtt 480
cctcccacga ttatctcgag atgtcaggtt ttcgagttca gaaacattcc cgacgagctc 540
atcgaaaaga ggctccagga agttgcggag gctgaaggaa tagagataga cagggaagct 600
ctgagcttca tcgcaaaaag agcctctgga ggcttgagag acgcgctcac catgctcgag 660
caggtgtgga agttctcgga aggaaagata gatctcgaga cggtacacag ggcgctcggg 720
ttgataccga tacaggttgt tcgcgattac gtgaacgcta tcttttctgg tgatgtgaaa 780
agggtcttca ccgttctcga cgacgtctat tacagcggga aggactacga ggtgctcatt 840
caggaagcag tcgaggatct ggtcgaagac ctggaaaggg agagaggggt ttaccaggtt 900
tcagcgaacg atatagttca ggtttcgaga caacttctga atcttctgag agagataaag 960
ttcgccgaag aaaaacgact cgtctgtaaa gtgggttcgg cttacatagc gacgaggttc 1020
tccaccacaa acgttcagga aaacgatgtc agagaaaaaa acgataattc aaatgtacag 1080
cagaaagaag agaagaaaga aacggtgaag gcaaaagaag aaaaacagga agacagcgag 1140
ttcgagaaac gcttcaaaga actcatggaa gaactgaaag aaaagggcga tctctctatc 1200
tttgtcgctc tcagcctctc agaggtgcag tttgacggag aaaaggtgat tatttctttt 1260
gattcatcga aagctatgca ttacgagttg atgaagaaaa aactgcctga gctggaaaac 1320
atttttttcta gaaaactcgg gaaaaaagta gaagttgaac ttcgactgat gggaaaagaa 1380
gaaacaatcg agaaggtttc tcagaagatc ctgagattgt ttgaacagga ggga 1434

<210> 142
<211> 478
<212> PRT

<213> Thermatoga maritima

<400> 142

```
Met Glu Val Leu Tyr Arg Lys Tyr Arg Pro Lys Thr Phe Ser Glu Val
  1               5                  10                  15

Val Asn Gln Asp His Val Lys Lys Ala Ile Ile Gly Ala Ile Gln Lys
             20                  25                  30

Asn Ser Val Ala His Gly Tyr Ile Phe Ala Gly Pro Arg Gly Thr Gly
         35                  40                  45

Lys Thr Thr Leu Ala Arg Ile Leu Ala Lys Ser Leu Asn Cys Glu Asn
     50                  55                  60

Arg Lys Gly Val Glu Pro Cys Asn Ser Cys Arg Ala Cys Arg Glu Ile
 65                  70                  75                  80

Asp Glu Gly Thr Phe Met Asp Val Ile Glu Leu Asp Ala Ala Ser Asn
                 85                  90                  95

Arg Gly Ile Asp Glu Ile Arg Arg Ile Arg Asp Ala Val Gly Tyr Arg
            100                 105                 110

Pro Met Glu Gly Lys Tyr Lys Val Tyr Ile Ile Asp Glu Val His Met
        115                 120                 125

Leu Thr Lys Glu Ala Phe Asn Ala Leu Leu Lys Thr Leu Glu Glu Pro
    130                 135                 140

Pro Ser His Val Val Phe Val Leu Ala Thr Thr Asn Leu Glu Lys Val
145                 150                 155                 160

Pro Pro Thr Ile Ile Ser Arg Cys Gln Val Phe Glu Phe Arg Asn Ile
                165                 170                 175

Pro Asp Glu Leu Ile Glu Lys Arg Leu Gln Glu Val Ala Glu Ala Glu
            180                 185                 190

Gly Ile Glu Ile Asp Arg Glu Ala Leu Ser Phe Ile Ala Lys Arg Ala
        195                 200                 205

Ser Gly Gly Leu Arg Asp Ala Leu Thr Met Leu Glu Gln Val Trp Lys
    210                 215                 220

Phe Ser Glu Gly Lys Ile Asp Leu Glu Thr Val His Arg Ala Leu Gly
225                 230                 235                 240
```

Leu Ile Pro Ile Gln Val Val Arg Asp Tyr Val Asn Ala Ile Phe Ser
245 250 255

Gly Asp Val Lys Arg Val Phe Thr Val Leu Asp Asp Val Tyr Tyr Ser
260 265 270

Gly Lys Asp Tyr Glu Val Leu Ile Gln Glu Ala Val Glu Asp Leu Val
275 280 285

Glu Asp Leu Glu Arg Glu Arg Gly Val Tyr Gln Val Ser Ala Asn Asp
290 295 300

Ile Val Gln Val Ser Arg Gln Leu Leu Asn Leu Leu Arg Glu Ile Lys
305 310 315 320

Phe Ala Glu Glu Lys Arg Leu Val Cys Lys Val Gly Ser Ala Tyr Ile
325 330 335

Ala Thr Arg Phe Ser Thr Thr Asn Val Gln Glu Asn Asp Val Arg Glu
340 345 350

Lys Asn Asp Asn Ser Asn Val Gln Gln Lys Glu Glu Lys Lys Glu Thr
355 360 365

Val Lys Ala Lys Glu Glu Lys Gln Glu Asp Ser Glu Phe Glu Lys Arg
370 375 380

Phe Lys Glu Leu Met Glu Glu Leu Lys Glu Lys Gly Asp Leu Ser Ile
385 390 395 400

Phe Val Ala Leu Ser Leu Ser Glu Val Gln Phe Asp Gly Glu Lys Val
405 410 415

Ile Ile Ser Phe Asp Ser Ser Lys Ala Met His Tyr Glu Leu Met Lys
420 425 430

Lys Lys Leu Pro Glu Leu Glu Asn Ile Phe Ser Arg Lys Leu Gly Lys
435 440 445

Lys Val Glu Val Glu Leu Arg Leu Met Gly Lys Glu Glu Thr Ile Glu
450 455 460

Lys Val Ser Gln Lys Ile Leu Arg Leu Phe Glu Gln Glu Gly
465 470 475

<210> 143
<211> 1098

<212> DNA
<213> Thermatoga maritima

<400> 143
atgaaagtaa ccgtcacgac tcttgaattg aaagacaaaa taaccatcgc ctcaaaagcg 60
ctcgcaaaga aatccgtgaa acccattctt gctggatttc ttttcgaagt gaaagatgga 120
aatttctaca tctgcgcgac cgatctcgag accggagtca aagcaaccgt gaatgccgct 180
gaaatctccg gtgaggcacg ttttgtggta ccaggagatg tcattcagaa gatggtcaag 240
gttctcccag atgagataac ggaactttct ttagaggggg atgctcttgt tataagttct 300
ggaagcaccg ttttcaggat caccaccatg cccgcggacg aatttccaga gataacgcct 360
gccgagtctg gaataacctt cgaagttgac acttcgctcc tcgaggaaat ggttgaaaag 420
gtcatcttcg ccgctgccaa agacgagttc atgcgaaatc tgaatggagt tttctgggaa 480
ctccacaaga atcttctcag gctggttgca agtgatggtt tcagacttgc acttgctgaa 540
gagcagatag aaaacgagga agaggcgagt ttcttgctct ctttgaagag catgaaagaa 600
gttcaaaacg tgctggacaa cacaacggag ccgactataa cggtgaggta cgatggaaga 660
agggtttctc tgtcgacaaa tgatgtagaa acggtgatga gagtggtcga cgctgaattt 720
cccgattaca aaagggtgat ccccgaaact ttcaaaacga aagtggtggt ttccagaaaa 780
gaactcaggg aatctttgaa gagggtgatg gtgattgcca gcaagggaag cgagtccgtg 840
aagttcgaaa tagaagaaaa cgttatgaga cttgtgagca agagcccgga ttatggagaa 900
gtggtcgatg aagttgaagt tcaaaaagaa ggggaagatc tcgtgatcgc tttcaacccg 960
aagttcatcg aggacgtttt gaagcacatt gagactgaag aaatcgaaat gaacttcgtt 1020
gattctacca gtccatgtca gataaatcca ctcgatattt ctggatacct ttacatagtg 1080
atgcccatca gactggca 1098

<210> 144
<211> 366
<212> PRT
<213> Thermatoga maritima

<400> 144
Met Lys Val Thr Val Thr Thr Leu Glu Leu Lys Asp Lys Ile Thr Ile
1 5 10 15

Ala Ser Lys Ala Leu Ala Lys Lys Ser Val Lys Pro Ile Leu Ala Gly
20 25 30

Phe Leu Phe Glu Val Lys Asp Gly Asn Phe Tyr Ile Cys Ala Thr Asp
35 40 45

Leu Glu Thr Gly Val Lys Ala Thr Val Asn Ala Ala Glu Ile Ser Gly
50 55 60

Glu Ala Arg Phe Val Val Pro Gly Asp Val Ile Gln Lys Met Val Lys
65 70 75 80

Val Leu Pro Asp Glu Ile Thr Glu Leu Ser Leu Glu Gly Asp Ala Leu
85 90 95

Val Ile Ser Ser Gly Ser Thr Val Phe Arg Ile Thr Thr Met Pro Ala
100 105 110

Asp Glu Phe Pro Glu Ile Thr Pro Ala Glu Ser Gly Ile Thr Phe Glu
115 120 125

Val Asp Thr Ser Leu Leu Glu Glu Met Val Glu Lys Val Ile Phe Ala
130 135 140

Ala Ala Lys Asp Glu Phe Met Arg Asn Leu Asn Gly Val Phe Trp Glu
145 150 155 160

Leu His Lys Asn Leu Leu Arg Leu Val Ala Ser Asp Gly Phe Arg Leu
165 170 175

Ala Leu Ala Glu Glu Gln Ile Glu Asn Glu Glu Glu Ala Ser Phe Leu
180 185 190

Leu Ser Leu Lys Ser Met Lys Glu Val Gln Asn Val Leu Asp Asn Thr
195 200 205

Thr Glu Pro Thr Ile Thr Val Arg Tyr Asp Gly Arg Arg Val Ser Leu
210 215 220

Ser Thr Asn Asp Val Glu Thr Val Met Arg Val Val Asp Ala Glu Phe
225 230 235 240

Pro Asp Tyr Lys Arg Val Ile Pro Glu Thr Phe Lys Thr Lys Val Val
245 250 255

Val Ser Arg Lys Glu Leu Arg Glu Ser Leu Lys Arg Val Met Val Ile
260 265 270

Ala Ser Lys Gly Ser Glu Ser Val Lys Phe Glu Ile Glu Glu Asn Val
275 280 285

Met Arg Leu Val Ser Lys Ser Pro Asp Tyr Gly Glu Val Val Asp Glu
290 295 300

Val Glu Val Gln Lys Glu Gly Glu Asp Leu Val Ile Ala Phe Asn Pro
305 310 315 320

Lys Phe Ile Glu Asp Val Leu Lys His Ile Glu Thr Glu Glu Ile Glu
325 330 335

Met Asn Phe Val Asp Ser Thr Ser Pro Cys Gln Ile Asn Pro Leu Asp
340 345 350

```
Ile Ser Gly Tyr Leu Tyr Ile Val Met Pro Ile Arg Leu Ala
        355                 360                 365
```

<210> 145
<211> 972
<212> DNA
<213> Thermatoga maritima

<400> 145
atgccagtca cgtttctcac aggtactgca gaaactcaga aggaagaatt gataaagaaa 60
ctcctgaagg atggtaacgt ggagtacata aggatccatc cggaggatcc cgacaagatc 120
gatttcataa ggtctttact caggacaaag acgatctttt ccaacaagac gatcattgac 180
atcgtcaatt tcgatgagtg gaaagcacag gagcagaagc gtctcgttga acttttgaaa 240
aacgtaccgg aagacgttca tatcttcatc cgttctcaaa aaacaggtgg aaagggagta 300
gcgctggagc ttccgaagcc atgggaaacg gacaagtggc ttgagtggat agaaaagcgc 360
ttcagggaga atggtttgct catcgataaa gatgcccttc agctgttttt ctccaaggtt 420
ggaacgaacg acctgatcat agaaagggag attgaaaaac tgaaagctta ttccgaggac 480
agaaagataa cggtagaaga cgtggaagag gtcgttttta cctatcagac tccgggatac 540
gatgattttt gctttgctgt ttccgaagga aaaaggaagc tcgctcactc tcttctgtcg 600
cagctgtgga aaaccacaga gtccgtggtg attgccactg tccttgcgaa tcacttcttg 660
gatctcttca aaatcctcgt tcttgtgaca aagaaaagat actacacctg gcctgatgtg 720
tccagggtgt ccaaagagct gggaattccc gttcctcgtg tggctcgttt cctcggtttc 780
tcctttaaga cctggaaatt caaggtgatg aaccacctcc tctactacga tgtgaagaag 840
gttagaaaga tactgaggga tctctacgat ctggacagag ccgtgaaaag cgaagaagat 900
ccaaaaccgt tcttccacga gttcatagaa gaggtggcac tggatgtata ttctcttcag 960
agagatgaag aa   972

<210> 146
<211> 324
<212> PRT
<213> Thermatoga maritima

<400> 146
```
Met Pro Val Thr Phe Leu Thr Gly Thr Ala Glu Thr Gln Lys Glu Glu
  1               5                  10                  15

Leu Ile Lys Lys Leu Leu Lys Asp Gly Asn Val Glu Tyr Ile Arg Ile
             20                  25                  30

His Pro Glu Asp Pro Asp Lys Ile Asp Phe Ile Arg Ser Leu Leu Arg
         35                  40                  45

Thr Lys Thr Ile Phe Ser Asn Lys Thr Ile Ile Asp Ile Val Asn Phe
     50                  55                  60
```

```
Asp Glu Trp Lys Ala Gln Glu Gln Lys Arg Leu Val Glu Leu Leu Lys
 65                  70                  75                  80

Asn Val Pro Glu Asp Val His Ile Phe Ile Arg Ser Gln Lys Thr Gly
                 85                  90                  95

Gly Lys Gly Val Ala Leu Glu Leu Pro Lys Pro Trp Glu Thr Asp Lys
            100                 105                 110

Trp Leu Glu Trp Ile Glu Lys Arg Phe Arg Glu Asn Gly Leu Leu Ile
        115                 120                 125

Asp Lys Asp Ala Leu Gln Leu Phe Phe Ser Lys Val Gly Thr Asn Asp
    130                 135                 140

Leu Ile Ile Glu Arg Glu Ile Glu Lys Leu Lys Ala Tyr Ser Glu Asp
145                 150                 155                 160

Arg Lys Ile Thr Val Glu Asp Val Glu Glu Val Val Phe Thr Tyr Gln
                165                 170                 175

Thr Pro Gly Tyr Asp Asp Phe Cys Phe Ala Val Ser Glu Gly Lys Arg
            180                 185                 190

Lys Leu Ala His Ser Leu Leu Ser Gln Leu Trp Lys Thr Thr Glu Ser
        195                 200                 205

Val Val Ile Ala Thr Val Leu Ala Asn His Phe Leu Asp Leu Phe Lys
    210                 215                 220

Ile Leu Val Leu Val Thr Lys Lys Arg Tyr Tyr Thr Trp Pro Asp Val
225                 230                 235                 240

Ser Arg Val Ser Lys Glu Leu Gly Ile Pro Val Pro Arg Val Ala Arg
                245                 250                 255

Phe Leu Gly Phe Ser Phe Lys Thr Trp Lys Phe Lys Val Met Asn His
            260                 265                 270

Leu Leu Tyr Tyr Asp Val Lys Lys Val Arg Lys Ile Leu Arg Asp Leu
        275                 280                 285

Tyr Asp Leu Asp Arg Ala Val Lys Ser Glu Glu Asp Pro Lys Pro Phe
    290                 295                 300

Phe His Glu Phe Ile Glu Glu Val Ala Leu Asp Val Tyr Ser Leu Gln
305                 310                 315                 320
```

Arg Asp Glu Glu

<210> 147
<211> 936
<212> DNA
<213> Thermatoga maritima

<400> 147
atgaacgatt tgatcagaaa gtacgctaaa gatcaactgg aaactttgaa aaggatcata 60
gaaaagtctg aaggaatatc catcctcata aatggagaag atctctcgta tccgagagaa 120
gtatcccttg aacttcccga gtacgtggag aaatttcccc cgaaggcctc ggatgttctg 180
gagatagatc ccgaggggga gaacataggc atagacgaca tcagaacgat aaaggacttc 240
ctgaactaca gccccgagct ctacacgaga aagtacgtga tagtccacga ctgtgaaaga 300
atgacccagc aggcggcgaa cgcgtttctg aaggcccttg aagaaccacc agaatacgct 360
gtgatcgttc tgaacactcg ccgctggcat tatctactgc cgacgataaa gagccgagtg 420
ttcagagtgg ttgtgaacgt tccaaaggag ttcagagatc tcgtgaaaga gaaaatagga 480
gatctctggg aggaacttcc acttcttgag agagacttca aaacggctct cgaagcctac 540
aaacttggtg cggaaaaact ttctggattg atggaaagtc tcaaagtttt ggagacggaa 600
aaactcttga aaaaggtcct ttcaaaaggc ctcgaaggtt atctcgcatg tagggagctc 660
ctggagagat tttcaaaggt ggaatcgaag gaattctttg cgcttttga tcaggtgact 720
aacacgataa caggaaaaga cgcgtttctt ttgatccaga gactgacaag aatcattctc 780
cacgaaaaca catgggaaag cgttgaagat caaaaaagcg tgtctttcct cgattcaatt 840
ctcagggtga agatagcgaa tctgaacaac aaactcactc tgatgaacat cctcgcgata 900
cacagagaga gaaagagagg tgtcaacgct tggagc 936

<210> 148
<211> 311
<212> PRT
<213> Thermatoga maritima

<400> 148
Met Asn Asp Leu Ile Arg Lys Tyr Ala Lys Asp Gln Leu Glu Thr Leu
1 5 10 15

Lys Arg Ile Ile Glu Lys Ser Glu Gly Ile Ser Ile Leu Ile Asn Gly
20 25 30

Glu Asp Leu Ser Tyr Pro Arg Glu Val Ser Leu Glu Leu Pro Glu Tyr
35 40 45

Val Glu Lys Phe Pro Pro Lys Ala Ser Asp Val Leu Glu Ile Asp Pro
50 55 60

Glu Gly Glu Asn Ile Gly Ile Asp Asp Ile Arg Thr Ile Lys Asp Phe
65 70 75 80

```
Leu Asn Tyr Ser Pro Glu Leu Tyr Thr Arg Lys Tyr Val Ile Val His
                 85                  90                  95

Asp Cys Glu Arg Met Thr Gln Gln Ala Ala Asn Ala Phe Leu Lys Ala
            100                 105                 110

Leu Glu Glu Pro Pro Glu Tyr Ala Val Ile Val Leu Asn Thr Arg Arg
        115                 120                 125

Trp His Tyr Leu Leu Pro Thr Ile Lys Ser Arg Val Phe Arg Val Val
    130                 135                 140

Val Asn Val Pro Lys Glu Phe Arg Asp Leu Val Lys Glu Lys Ile Gly
145                 150                 155                 160

Asp Leu Trp Glu Glu Leu Pro Leu Leu Glu Arg Asp Phe Lys Thr Ala
                165                 170                 175

Leu Glu Ala Tyr Lys Leu Gly Ala Glu Lys Leu Ser Gly Leu Met Glu
            180                 185                 190

Ser Leu Lys Val Leu Glu Thr Glu Lys Leu Leu Lys Lys Val Leu Ser
        195                 200                 205

Lys Gly Leu Glu Gly Tyr Leu Ala Cys Arg Glu Leu Leu Glu Arg Phe
    210                 215                 220

Ser Lys Val Glu Ser Lys Glu Phe Phe Ala Leu Phe Asp Gln Val Thr
225                 230                 235                 240

Asn Thr Ile Thr Gly Lys Asp Ala Phe Leu Leu Ile Gln Arg Leu Thr
                245                 250                 255

Arg Ile Ile Leu His Glu Asn Thr Trp Glu Ser Val Glu Asp Lys Ser
            260                 265                 270

Val Ser Phe Leu Asp Ser Ile Leu Arg Val Lys Ile Ala Asn Leu Asn
        275                 280                 285

Asn Lys Leu Thr Leu Met Asn Ile Leu Ala Ile His Arg Glu Arg Lys
    290                 295                 300

Arg Gly Val Asn Ala Trp Ser
305                 310
```

<210> 149

<211> 423
<212> DNA
<213> Thermatoga maritima

<400> 149
atgtctttct tcaacaagat catactcata ggaagactcg tgagagatcc cgaagagaga 60
tacacgctca gcggaactcc agtcaccacc ttcaccatag cggtggacag ggttcccaga 120
aagaacgcgc cggacgacgc tcaaacgact gatttcttca ggatcgtcac ctttggaaga 180
ctggcagagt tcgctagaac ctatctcacc aaaggaaggc tcgttctcgt cgaaggtgaa 240
atgagaatga gaagatggga aacacccact ggagaaaaga gggtatctcc ggaggttgtc 300
gcaaacgttg ttagattcat ggacagaaaa cctgctgaaa cagttagcga gactgaagag 360
gagctggaaa taccggaaga agacttttcc agcgatacct tcagtgaaga tgaaccacca 420
ttt 423

<210> 150
<211> 141
<212> PRT
<213> Thermatoga maritima

<400> 150
Met Ser Phe Phe Asn Lys Ile Ile Leu Ile Gly Arg Leu Val Arg Asp
1 5 10 15

Pro Glu Glu Arg Tyr Thr Leu Ser Gly Thr Pro Val Thr Thr Phe Thr
20 25 30

Ile Ala Val Asp Arg Val Pro Arg Lys Asn Ala Pro Asp Asp Ala Gln
35 40 45

Thr Thr Asp Phe Phe Arg Ile Val Thr Phe Gly Arg Leu Ala Glu Phe
50 55 60

Ala Arg Thr Tyr Leu Thr Lys Gly Arg Leu Val Leu Val Glu Gly Glu
65 70 75 80

Met Arg Met Arg Arg Trp Glu Thr Pro Thr Gly Glu Lys Arg Val Ser
85 90 95

Pro Glu Val Val Ala Asn Val Val Arg Phe Met Asp Arg Lys Pro Ala
100 105 110

Glu Thr Val Ser Glu Thr Glu Glu Glu Leu Glu Ile Pro Glu Glu Asp
115 120 125

Phe Ser Ser Asp Thr Phe Ser Glu Asp Glu Pro Pro Phe
130 135 140

<210> 151
<211> 1353
<212> DNA
<213> Thermatoga maritima

<400> 151
atgcgtgttc ccccgcacaa cttagaggcc gaagttgctg tgctcggaag catattgata 60
gatccgtcgg taataaacga cgttcttgaa attttgagcc acgaagattt ctatctgaaa 120
aaacaccaac acatcttcag agcgatggaa gagctttacg acgaaggaaa accggtggac 180
gtggtttccg tctgtgacaa gcttcaaagc atgggaaaac tcgaggaagt aggtggagat 240
ctggaagtgg cccagctcgc tgaggctgtg cccagttctg cacacgcact tcactacgcg 300
gagatcgtca aggaaaaatc cattctgagg aaactcattg agatctccag aaaaatctca 360
gaaagtgcct acatggaaga agatgtggag atcctgctcg acaacgcaga aaagatgatc 420
ttcgagatct cagagatgaa aacgacaaaa tcctacgatc atctgagagg catcatgcac 480
cgggtgtttg aaaacctgga gaacttcagg gaaagagcca accttataga acccggtgtg 540
ctcataacgg gactaccaac gggattcaaa agtctggaca aacagaccac agggttccac 600
agctccgatc tggtgataat agcagcgaga ccctccatgg gaaaaacctc cttcgcactc 660
tcaatagcga ggaacatggc tgtcaatttc gaaatccccg tcggaatatt cagtctcgag 720
atgtccaagg aacagctcgc tcaaagacta ctcagcatgg agtccggtgt ggatctttac 780
agcatcagaa caggatacct ggatcaggag aagtgggaaa gactcacaat agcggcttct 840
aaactctaca aagcacccat agttgtggac gatgagtcac tcctcgatcc gcgatcgttg 900
agggcaaaag cgagaaggat gaaaaaagaa tacgatgtaa aagccatttt tgtcgactat 960
ctccagctca tgcacctgaa aggaagaaaa gaaagcagac agcaggagat atccgagatc 1020
tcgagatctc tgaagctcct tgcgagggaa ctcgacatag tggtgatagc gctttcacag 1080
ctttcgaggg ccgtagaaca gagagaagac aaaagaccga ggctgagtga cctcagggaa 1140
tccggtgcga tagaacagga cgcagacaca gtcatcttca tctacaggga ggaatattac 1200
aggagcaaaa aatccaaaga ggaaagcaag cttcacgaac ctcacgaagc tgaaatcata 1260
ataggtaaac agagaaacgg tcccgttgga acgatcactc tgatcttcga ccccagaacg 1320
gttacgttcc atgaagtcga tgtggtgcat tca 1353

<210> 152
<211> 451
<212> PRT
<213> Thermatoga maritima

<400> 152
Met Arg Val Pro Pro His Asn Leu Glu Ala Glu Val Ala Val Leu Gly
1 5 10 15

Ser Ile Leu Ile Asp Pro Ser Val Ile Asn Asp Val Leu Glu Ile Leu
20 25 30

Ser His Glu Asp Phe Tyr Leu Lys Lys His Gln His Ile Phe Arg Ala
35 40 45

Met Glu Glu Leu Tyr Asp Glu Gly Lys Pro Val Asp Val Val Ser Val

```
     50                  55                  60

Cys Asp Lys Leu Gln Ser Met Gly Lys Leu Glu Glu Val Gly Gly Asp
 65                  70                  75                  80

Leu Glu Val Ala Gln Leu Ala Glu Ala Val Pro Ser Ser Ala His Ala
                 85                  90                  95

Leu His Tyr Ala Glu Ile Val Lys Glu Lys Ser Ile Leu Arg Lys Leu
            100                 105                 110

Ile Glu Ile Ser Arg Lys Ile Ser Glu Ser Ala Tyr Met Glu Glu Asp
        115                 120                 125

Val Glu Ile Leu Leu Asp Asn Ala Glu Lys Met Ile Phe Glu Ile Ser
    130                 135                 140

Glu Met Lys Thr Thr Lys Ser Tyr Asp His Leu Arg Gly Ile Met His
145                 150                 155                 160

Arg Val Phe Glu Asn Leu Glu Asn Phe Arg Glu Arg Ala Asn Leu Ile
                165                 170                 175

Glu Pro Gly Val Leu Ile Thr Gly Leu Pro Thr Gly Phe Lys Ser Leu
            180                 185                 190

Asp Lys Gln Thr Thr Gly Phe His Ser Ser Asp Leu Val Ile Ile Ala
        195                 200                 205

Ala Arg Pro Ser Met Gly Lys Thr Ser Phe Ala Leu Ser Ile Ala Arg
    210                 215                 220

Asn Met Ala Val Asn Phe Glu Ile Pro Val Gly Ile Phe Ser Leu Glu
225                 230                 235                 240

Met Ser Lys Glu Gln Leu Ala Gln Arg Leu Leu Ser Met Glu Ser Gly
                245                 250                 255

Val Asp Leu Tyr Ser Ile Arg Thr Gly Tyr Leu Asp Gln Glu Lys Trp
            260                 265                 270

Glu Arg Leu Thr Ile Ala Ala Ser Lys Leu Tyr Lys Ala Pro Ile Val
        275                 280                 285

Val Asp Asp Glu Ser Leu Leu Asp Pro Arg Ser Leu Arg Ala Lys Ala
    290                 295                 300

Arg Arg Met Lys Lys Glu Tyr Asp Val Lys Ala Ile Phe Val Asp Tyr
```

305 310 315 320

Leu Gln Leu Met His Leu Lys Gly Arg Lys Glu Ser Arg Gln Gln Glu
325 330 335

Ile Ser Glu Ile Ser Arg Ser Leu Lys Leu Leu Ala Arg Glu Leu Asp
340 345 350

Ile Val Val Ile Ala Leu Ser Gln Leu Ser Arg Ala Val Glu Gln Arg
355 360 365

Glu Asp Lys Arg Pro Arg Leu Ser Asp Leu Arg Glu Ser Gly Ala Ile
370 375 380

Glu Gln Asp Ala Asp Thr Val Ile Phe Ile Tyr Arg Glu Glu Tyr Tyr
385 390 395 400

Arg Ser Lys Lys Ser Lys Glu Glu Ser Lys Leu His Glu Pro His Glu
405 410 415

Ala Glu Ile Ile Ile Gly Lys Gln Arg Asn Gly Pro Val Gly Thr Ile
420 425 430

Thr Leu Ile Phe Asp Pro Arg Thr Val Thr Phe His Glu Val Asp Val
435 440 445

Val His Ser
450

<210> 153
<211> 1695
<212> DNA
<213> Thermatoga maritima

<400> 153
gtgattcctc gagaggtcat cgaggaaata aaagaaaagg ttgacatcgt agaggtcatt 60
tccgagtacg tgaatcttac ccgggtaggt tcctcctaca gggctctctg tccctttcat 120
tcagaaacca atccttcttt ctacgttcat ccgggtttga agatatacca ttgtttcggc 180
tgcggtgcga gtggagacgt catcaaattt cttcaagaaa tggaagggat cagtttccag 240
gaagcgctgg aaagacttgc caaaagagct gggattgatc tttctctcta cagaacagaa 300
gggacttctg aatacggaaa atacattcgt ttgtacgaag aaacgtggaa aaggtacgtc 360
aaagagctgg agaaatcgaa agaggcaaaa gactatttaa aaagcagagg cttctctgaa 420
gaagatatag caaagttcgg ctttgggtac gtccccaaga gatccagcat ctctatagaa 480
gttgcagaag gcatgaacat aacactggaa gaacttgtca gatacggtat cgcgctgaaa 540
aagggtgatc gattcgttga tagattcgaa ggaagaatcg ttgttccaat aaagaacgac 600
agtggtcata ttgtggcttt tggtgggcgt gctctcggca acgaagaacc gaagtatttg 660
aactctccag agaccaggta tttttcgaag aagaagaccc tttttctctt cgatgaggcg 720

aaaaaagtgg caaaagaggt tggtttttttc gtcatcaccg aaggctactt cgacgcgctc 780
gcattcagaa aggatggaat accaacggcg gtcgctgttc ttggggcgag tctttcaaga 840
gaggcgattc taaaactttc ggcgtattcg aaaaacgtca tactgtgttt cgataatgac 900
aaagcaggct tcagagccac tctcaaatcc ctcgaggatc tcctagacta cgaattcaac 960
gtgcttgtgg caacccccctc tccttacaaa gacccagatg aactctttca gaaagaagga 1020
gaaggttcat tgaaaaagat gctgaaaaac tcgcgttcgt tcgaatattt tctggtgacg 1080
gctggtgagg tcttctttga caggaacagc cccgcgggtg tgagatccta cctttctttc 1140
ctcaaaggtt gggtccaaaa gatgagaagg aaaggatatt tgaaacacat agaaaatctc 1200
gtgaatgagg tttcatcttc tctccagata ccagaaaacc agattttgaa ctttttttgaa 1260
agcgacaggt ctaacactat gcctgttcat gagaccaagt cgtcaaaggt ttacgatgag 1320
gggagaggac tggcttattt gtttttgaac tacgaggatt tgagggaaaa gattctggaa 1380
ctggacttag aggtactgga agataaaaac gcgagggagt ttttcaagag agtctcactg 1440
ggagaagatt tgaacaaagt catagaaaac ttcccaaaag agctgaaaga ctggattttt 1500
gagacaatag aaagcattcc tcctccaaag gatcccgaga aattcctcgg tgacctctcc 1560
gaaaagttga aaatccgacg gatagagaga cgtatcgcag aaatagatga tatgataaag 1620
aaagcttcaa acgatgaaga aaggcgtctt cttctctcta tgaaagtgga tctcctcaga 1680
aaaataaaga ggagg 1695

<210> 154
<211> 565
<212> PRT
<213> Thermatoga maritima

<400> 154
Met Ile Pro Arg Glu Val Ile Glu Glu Ile Lys Glu Lys Val Asp Ile
1 5 10 15

Val Glu Val Ile Ser Glu Tyr Val Asn Leu Thr Arg Val Gly Ser Ser
20 25 30

Tyr Arg Ala Leu Cys Pro Phe His Ser Glu Thr Asn Pro Ser Phe Tyr
35 40 45

Val His Pro Gly Leu Lys Ile Tyr His Cys Phe Gly Cys Gly Ala Ser
50 55 60

Gly Asp Val Ile Lys Phe Leu Gln Glu Met Glu Gly Ile Ser Phe Gln
65 70 75 80

Glu Ala Leu Glu Arg Leu Ala Lys Arg Ala Gly Ile Asp Leu Ser Leu
85 90 95

Tyr Arg Thr Glu Gly Thr Ser Glu Tyr Gly Lys Tyr Ile Arg Leu Tyr
100 105 110

Glu Glu Thr Trp Lys Arg Tyr Val Lys Glu Leu Glu Lys Ser Lys Glu
115 120 125

```
Ala Lys Asp Tyr Leu Lys Ser Arg Gly Phe Ser Glu Glu Asp Ile Ala
    130                 135                 140

Lys Phe Gly Phe Gly Tyr Val Pro Lys Arg Ser Ser Ile Ser Ile Glu
145                 150                 155                 160

Val Ala Glu Gly Met Asn Ile Thr Leu Glu Glu Leu Val Arg Tyr Gly
                165                 170                 175

Ile Ala Leu Lys Lys Gly Asp Arg Phe Val Asp Arg Phe Glu Gly Arg
            180                 185                 190

Ile Val Val Pro Ile Lys Asn Asp Ser Gly His Ile Val Ala Phe Gly
        195                 200                 205

Gly Arg Ala Leu Gly Asn Glu Glu Pro Lys Tyr Leu Asn Ser Pro Glu
    210                 215                 220

Thr Arg Tyr Phe Ser Lys Lys Lys Thr Leu Phe Leu Phe Asp Glu Ala
225                 230                 235                 240

Lys Lys Val Ala Lys Glu Val Gly Phe Phe Val Ile Thr Glu Gly Tyr
                245                 250                 255

Phe Asp Ala Leu Ala Phe Arg Lys Asp Gly Ile Pro Thr Ala Val Ala
            260                 265                 270

Val Leu Gly Ala Ser Leu Ser Arg Glu Ala Ile Leu Lys Leu Ser Ala
        275                 280                 285

Tyr Ser Lys Asn Val Ile Leu Cys Phe Asp Asn Asp Lys Ala Gly Phe
    290                 295                 300

Arg Ala Thr Leu Lys Ser Leu Glu Asp Leu Leu Asp Tyr Glu Phe Asn
305                 310                 315                 320

Val Leu Val Ala Thr Pro Ser Pro Tyr Lys Asp Pro Asp Glu Leu Phe
                325                 330                 335

Gln Lys Glu Gly Glu Gly Ser Leu Lys Lys Met Leu Lys Asn Ser Arg
            340                 345                 350

Ser Phe Glu Tyr Phe Leu Val Thr Ala Gly Glu Val Phe Phe Asp Arg
        355                 360                 365

Asn Ser Pro Ala Gly Val Arg Ser Tyr Leu Ser Phe Leu Lys Gly Trp
    370                 375                 380
```

```
Val Gln Lys Met Arg Arg Lys Gly Tyr Leu Lys His Ile Glu Asn Leu
385                 390                 395                 400

Val Asn Glu Val Ser Ser Ser Leu Gln Ile Pro Glu Asn Gln Ile Leu
                405                 410                 415

Asn Phe Phe Glu Ser Asp Arg Ser Asn Thr Met Pro Val His Glu Thr
            420                 425                 430

Lys Ser Ser Lys Val Tyr Asp Glu Gly Arg Gly Leu Ala Tyr Leu Phe
        435                 440                 445

Leu Asn Tyr Glu Asp Leu Arg Glu Lys Ile Leu Glu Leu Asp Leu Glu
    450                 455                 460

Val Leu Glu Asp Lys Asn Ala Arg Glu Phe Phe Lys Arg Val Ser Leu
465                 470                 475                 480

Gly Glu Asp Leu Asn Lys Val Ile Glu Asn Phe Pro Lys Glu Leu Lys
                485                 490                 495

Asp Trp Ile Phe Glu Thr Ile Glu Ser Ile Pro Pro Pro Lys Asp Pro
            500                 505                 510

Glu Lys Phe Leu Gly Asp Leu Ser Glu Lys Leu Lys Ile Arg Arg Ile
        515                 520                 525

Glu Arg Arg Ile Ala Glu Ile Asp Asp Met Ile Lys Lys Ala Ser Asn
    530                 535                 540

Asp Glu Glu Arg Arg Leu Leu Leu Ser Met Lys Val Asp Leu Leu Arg
545                 550                 555                 560

Lys Ile Lys Arg Arg
                565
```

<210> 155
<211> 804
<212> DNA
<213> Thermus thermophilus

<400> 155
atggctctac acccggctca ccctggggca ataatcgggc acgaggccgt tctcgccctc 60
cttccccgcc tcaccgccca gaccctgctc ttctccggcc ccgagggggt ggggcggcgc 120
accgtggccc gctggtacgc ctgggggctc aaccgcggct tccccccgcc ctccctgggg 180
gagcacccgg acgtcctcga ggtggggccc aaggcccggg acctccgggg ccgggccgag 240

gtgcggctgg aggaggtggc gcccctcttg gagtggtgct ccagccaccc ccgggagcgg 300
gtgaaggtgg ccatcctgga ctcggcccac ctcctcaccg aggccgccgc caacgccctc 360
ctcaagctcc tggaggagcc cccttcctac gcccgcatcg tcctcatcgc cccaagccgc 420
gccaccctcc tccccaccct ggcctcccgg gccacggagg tggcattcgc ccccgtgccc 480
gaggaggccc tgcgcgccct cacccaggac ccggagctcc tccgctacgc cgccggggcc 540
ccgggccgcc tccttagggc cctccaggac ccggaggggt accgggcccg catggccagg 600
gcgcaaaggg tcctgaaagc cccgcccctg gagcgcctcg ctttgcttcg ggagcttttg 660
gccgaggagg agggggtcca cgccctccac gccgtcctaa agcgcccgga gcacctcctt 720
gccctggagc gggcgcggga ggccctggag gggtacgtga gccccgagct ggtcctcgcc 780
cggctggcct tagacttaga gaca 804

<210> 156
<211> 268
<212> PRT
<213> Thermus thermophilus

<400> 156
Met Ala Leu His Pro Ala His Pro Gly Ala Ile Ile Gly His Glu Ala
1 5 10 15

Val Leu Ala Leu Leu Pro Arg Leu Thr Ala Gln Thr Leu Leu Phe Ser
20 25 30

Gly Pro Glu Gly Val Gly Arg Arg Thr Val Ala Arg Trp Tyr Ala Trp
35 40 45

Gly Leu Asn Arg Gly Phe Pro Pro Pro Ser Leu Gly Glu His Pro Asp
50 55 60

Val Leu Glu Val Gly Pro Lys Ala Arg Asp Leu Arg Gly Arg Ala Glu
65 70 75 80

Val Arg Leu Glu Glu Val Ala Pro Leu Leu Glu Trp Cys Ser Ser His
85 90 95

Pro Arg Glu Arg Val Lys Val Ala Ile Leu Asp Ser Ala His Leu Leu
100 105 110

Thr Glu Ala Ala Ala Asn Ala Leu Leu Lys Leu Leu Glu Glu Pro Pro
115 120 125

Ser Tyr Ala Arg Ile Val Leu Ile Ala Pro Ser Arg Ala Thr Leu Leu
130 135 140

Pro Thr Leu Ala Ser Arg Ala Thr Glu Val Ala Phe Ala Pro Val Pro
145 150 155 160

```
Glu Glu Ala Leu Arg Ala Leu Thr Gln Asp Pro Glu Leu Leu Arg Tyr
                165                 170                 175

Ala Ala Gly Ala Pro Gly Arg Leu Leu Arg Ala Leu Gln Asp Pro Glu
            180                 185                 190

Gly Tyr Arg Ala Arg Met Ala Arg Ala Gln Arg Val Leu Lys Ala Pro
        195                 200                 205

Pro Leu Glu Arg Leu Ala Leu Leu Arg Glu Leu Leu Ala Glu Glu Glu
    210                 215                 220

Gly Val His Ala Leu His Ala Val Leu Lys Arg Pro Glu His Leu Leu
225                 230                 235                 240

Ala Leu Glu Arg Ala Arg Glu Ala Leu Glu Gly Tyr Val Ser Pro Glu
                245                 250                 255

Leu Val Leu Ala Arg Leu Ala Leu Asp Leu Glu Thr
            260                 265
```

<210> 157
<211> 729
<212> DNA
<213> Thermus thermophilus

<400> 157
atgctggacc tgagggaggt gggggaggcg gagtggaagg ccctaaagcc ccttttggaa 60
agcgtgcccg agggcgtccc cgtcctcctc ctggacccta agccaagccc ctcccgggcg 120
gccttctacc ggaaccggga aaggcgggac ttccccaccc ccaaggggaa ggacctggtg 180
cggcacctgg aaaaccgggc caagcgcctg gggctcaggc tcccgggcgg ggtggcccag 240
tacctggcct ccctggaggg ggacctcgag gccctggagc gggagctgga gaagcttgcc 300
ctcctctccc cacccctcac cctggagaag gtggagaagg tggtggccct gaggcccccc 360
ctcacgggct ttgacctggt gcgctccgtc ctggagaagg accccaagga ggccctcctg 420
cgcctaggcg gcctcaagga ggagggggag gagcccctca ggctcctcgg ggccctctcc 480
tggcagttcg ccctcctcgc ccgggccttc ttcctcctcc gggaaaaccc caggcccaag 540
gaggaggacc tcgcccgcct cgaggcccac ccctacgccg cccgccgcgc cctggaggcg 600
gcgaagcgcc tcacggaaga ggccctcaag gaggccctgg acgccctcat ggaggcggaa 660
aagagggcca agggggggaa agacccgtgg ctcgccctgg aggcggcggt cctccgcctc 720
gcccgttga   729

<210> 158
<211> 292
<212> PRT
<213> Thermus thermophilus

<400> 158

```
Met Val Ile Ala Phe Thr Gly Asp Pro Phe Leu Ala Arg Glu Ala Leu
  1               5                  10                  15

Leu Glu Glu Ala Arg Leu Arg Gly Leu Ser Arg Phe Thr Glu Pro Thr
             20                  25                  30

Pro Glu Ala Leu Ala Gln Ala Leu Ala Pro Gly Leu Phe Gly Gly Gly
         35                  40                  45

Gly Ala Met Leu Asp Leu Arg Glu Val Gly Glu Ala Glu Trp Lys Ala
     50                  55                  60

Leu Lys Pro Leu Leu Glu Ser Val Pro Glu Gly Val Pro Val Leu Leu
 65                  70                  75                  80

Leu Asp Pro Lys Pro Ser Pro Ser Arg Ala Ala Phe Tyr Arg Asn Arg
                 85                  90                  95

Glu Arg Arg Asp Phe Pro Thr Pro Lys Gly Lys Asp Leu Val Arg His
            100                 105                 110

Leu Glu Asn Arg Ala Lys Arg Leu Gly Leu Arg Leu Pro Gly Gly Val
        115                 120                 125

Ala Gln Tyr Leu Ala Ser Leu Glu Gly Asp Leu Glu Ala Leu Glu Arg
    130                 135                 140

Glu Leu Glu Lys Leu Ala Leu Leu Ser Pro Pro Leu Thr Leu Glu Lys
145                 150                 155                 160

Val Glu Lys Val Val Ala Leu Arg Pro Pro Leu Thr Gly Phe Asp Leu
                165                 170                 175

Val Arg Ser Val Leu Glu Lys Asp Pro Lys Glu Ala Leu Leu Arg Leu
            180                 185                 190

Gly Gly Leu Lys Glu Glu Gly Glu Glu Pro Leu Arg Leu Leu Gly Ala
        195                 200                 205

Leu Ser Trp Gln Phe Ala Leu Leu Ala Arg Ala Phe Phe Leu Leu Arg
    210                 215                 220

Glu Asn Pro Arg Pro Lys Glu Glu Asp Leu Ala Arg Leu Glu Ala His
225                 230                 235                 240

Pro Tyr Ala Ala Arg Arg Ala Leu Glu Ala Ala Lys Arg Leu Thr Glu
                245                 250                 255
```

Glu Ala Leu Lys Glu Ala Leu Asp Ala Leu Met Glu Ala Glu Lys Arg
260 265 270

Ala Lys Gly Gly Lys Asp Pro Trp Leu Ala Leu Glu Ala Ala Val Leu
275 280 285

Arg Leu Ala Arg
290

<210> 159
<211> 37
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: primer

<400> 159
gtgtgtcata tgagtaagga tttcgtccac cttcacc 37

<210> 160
<211> 34
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: primer

<400> 160
gtgtgtggat ccggggacta ctcggaagta aggg 34

<210> 161
<211> 36
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: primer

<400> 161
gtgtgtcata tggaaaccac aatattccag ttccag 36

<210> 162

<211> 39
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: primer

<400> 162
gtgtgtggat ccttatccac catgagaagt atttttcac 39

<210> 163
<211> 41
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: primer

<400> 163
gtgtgtcata tggaaaaagt ttttttgga aaaaactcca g 41

<210> 164
<211> 35
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: primer

<400> 164
gtgtgtggat ccttaatccg cctgaacggc taacg 35

<210> 165
<211> 41
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: primer

<400> 165
gtgtgtcata tgaactacgt tcccttcgcg agaaagtaca g 41

<210> 166

<211> 36
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: primer

<400> 166
gtgtgtggat ccttaaaaca gcctcgtccc gctgga 36

<210> 167
<211> 33
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: primer

<400> 167
gtgtgtcata tgcgcgttaa ggtggacagg gag 33

<210> 168
<211> 35
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: primer

<400> 168
tgtgtctcga gtcatggcta caccctcatc ggcat 35

<210> 169
<211> 47
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: primer

<400> 169
gtgtgtcata tgctcaataa ggtttttata ataggaagac ttacggg 47

<210> 170

<211> 39
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: primer

<400> 170
gtgtggatcc ttaaaaaggt atttcgtcct cttcatcgg 39

<210> 171
<211> 807
<212> DNA
<213> Thermus thermophilus

<400> 171
atggctcgag gcctgaaccg cgttttcctc atcggcgccc tcgccacccg gccggacatg 60
cgctacaccc cggcggggct cgccattttg gacctgaccc tcgccggtca ggacctgctt 120
ctttccgata acgggggga accggaggtg tcctggtacc accgggtgag gctcttaggc 180
cgccaggcgg agatgtgggg cgacctcttg gaccaagggc agctcgtctt cgtggagggc 240
cgcctggagt accgccagtg ggaaagggag ggggagaagc ggagcgagct ccagatccgg 300
gccgacttcc ggacccccctg gacgaccggg ggaagaagcg ggcggaggac agccggggcc 360
agcccaggct ccgcgccgcc ctgaaccagg tcttcctcat gggcaacctg acccgggacc 420
cggaactccg ctacaccccc cagggcaccg cggtggcccg gctgggcctg gcggtgaacg 480
agcgccgcca gggggcggag gagcgcaccc acttcgtgga ggttcaggcc tggcgcgacc 540
tggcggagtg ggccgccgag ctgaggaagg gcgacggcct tttcgtgatc ggcaggttgg 600
tgaacgactc ctggaccagc tccagcggcg agcggcgctt ccagacccgt gtggaggccc 660
tcaggctgga gcgccccacc cgtggacctg cccaggcctg cccaggccgg cggaacaggt 720
cccgcgaagt ccagacgggt ggggtggaca ttgacgaagg cttggaagac tttccgccgg 780
aggaggattt gccgttttga gcacgaa 807

<210> 172
<211> 266
<212> PRT
<213> Thermus thermophilus

<400> 172
Met Ala Arg Gly Leu Asn Arg Val Phe Leu Ile Gly Ala Leu Ala Thr
1 5 10 15

Arg Pro Asp Met Arg Tyr Thr Pro Ala Gly Leu Ala Ile Leu Asp Leu
20 25 30

Thr Leu Ala Gly Gln Asp Leu Leu Leu Ser Asp Asn Gly Gly Glu Pro
35 40 45

```
Glu Val Ser Trp Tyr His Arg Val Arg Leu Leu Gly Arg Gln Ala Glu
     50                  55                  60

Met Trp Gly Asp Leu Leu Asp Gln Gly Gln Leu Val Phe Val Glu Gly
 65                  70                  75                  80

Arg Leu Glu Tyr Arg Gln Trp Glu Arg Glu Gly Glu Lys Arg Ser Glu
                 85                  90                  95

Leu Gln Ile Arg Ala Asp Phe Leu Asp Pro Leu Asp Asp Arg Gly Lys
            100                 105                 110

Lys Arg Ala Glu Asp Ser Arg Gly Gln Pro Arg Leu Arg Ala Ala Leu
        115                 120                 125

Asn Gln Val Phe Leu Met Gly Asn Leu Thr Arg Asp Pro Glu Leu Arg
    130                 135                 140

Tyr Thr Pro Gln Gly Thr Ala Val Ala Arg Leu Gly Leu Ala Val Asn
145                 150                 155                 160

Glu Arg Arg Gln Gly Ala Glu Glu Arg Thr His Phe Val Glu Val Gln
                165                 170                 175

Ala Trp Arg Asp Leu Ala Glu Trp Ala Ala Glu Leu Arg Lys Gly Asp
            180                 185                 190

Gly Leu Phe Val Ile Gly Arg Leu Val Asn Asp Ser Trp Thr Ser Ser
        195                 200                 205

Ser Gly Glu Arg Arg Phe Gln Thr Arg Val Glu Ala Leu Arg Leu Glu
    210                 215                 220

Arg Pro Thr Arg Gly Pro Ala Gln Ala Cys Pro Gly Arg Arg Asn Arg
225                 230                 235                 240

Ser Arg Glu Val Gln Thr Gly Gly Val Asp Ile Asp Glu Gly Leu Glu
                245                 250                 255

Asp Phe Pro Pro Glu Glu Asp Leu Pro Phe
            260                 265
```

<210> 173
<211> 992
<212> DNA
<213> Bacillus stearothermophilus

<400> 173
aattccgaca tttcaattga atcgtttatt ccgcttgaaa aagaaggcaa gttgctcgtt 60
gatgtgaaaa gaccggggag catcgtactg caggcgcgct ttttctctga aatcgtgaaa 120
aaactgccgc aacaaacggt ggaaatcgaa acggaagaca acttttgac gatcatccgc 180
tcggggcact cagaattccg cctcaatggg ctaaacgccg acgaatatcc gcgcctgccg 240
caaattgaag aagaaaacgt gtttcaaatc ccggctgatt tattgaaaac cgtgattcgg 300
caaacggtgt tcgccgtttc tacatcggaa acgcgcccaa tcttgacagg tgtcaactgg 360
aaagttgaac atggcgagct tgtctgcaca gcgaccgaca gtcatcgctt agccatgcgc 420
aaagtgaaaa ttgagtcgga aaatgaagta tcatacaacg tcgtcatccc tggaaaaagt 480
cttaatgagc tcagcaaaat tttggatgac ggcaaccacc cggtggacat cgtcatgaca 540
gccaatcaag tgctatttaa ggccgagcac cttctcttct tttcccggct gcttgacggc 600
aactatccgg agacggcccg cttgattcca acagaaagca aaacgaccat gatcgtcaat 660
gcaaaagagt ttctgcaggc aatcgaccga gcgtccttgc ttgctcgaga aggaaggaac 720
aacgttgtga aactgacgac gcttcctgga ggaatgctcg aaatttcttc gatttctccg 780
agatcgggaa agtgacggag cagctgcaaa cggagtctct tgaaggggaa gagttgaaca 840
tttcgttcag cgcgaaatat atgatggacg cgttgcgggc gcttgatgga acagacattt 900
caaatcagct tcactggggc catgcggccg ttcctgttgc gcccgcttca accgattcga 960
tgcttcagct cattttgccg gtgagaacat at 992

<210> 174
<211> 334
<212> PRT
<213> Bacillus stearothermophilus

<400> 174
Asn Ser Asp Ile Ser Ile Ile Glu Ser Phe Ile Pro Leu Glu Lys Glu
1 5 10 15

Gly Lys Leu Leu Val Asp Val Lys Arg Pro Gly Ser Ile Val Leu Gln
20 25 30

Ala Arg Phe Phe Ser Glu Ile Val Lys Lys Leu Pro Gln Gln Thr Val
35 40 45

Glu Ile Glu Thr Glu Asp Asn Phe Leu Thr Ile Ile Arg Ser Gly His
50 55 60

Ser Glu Phe Arg Leu Asn Gly Leu Asn Ala Asp Glu Tyr Pro Arg Leu
65 70 75 80

Pro Gln Ile Glu Glu Glu Asn Val Phe Gln Ile Pro Ala Asp Leu Leu
85 90 95

Lys Thr Val Ile Arg Gln Thr Val Phe Ala Val Ser Thr Ser Glu Thr
100 105 110

Arg Pro Ile Leu Thr Gly Val Asn Trp Lys Val Glu His Gly Glu Leu

```
        115                 120                 125

Val Cys Thr Ala Thr Asp Ser His Arg Leu Ala Met Arg Lys Val Lys
    130                 135                 140

Ile Ile Glu Ser Glu Asn Glu Val Ser Tyr Asn Val Val Ile Pro Gly
145                 150                 155                 160

Lys Ser Leu Asn Glu Leu Ser Lys Ile Ile Leu Asp Asp Gly Asn His
                165                 170                 175

Pro Val Asp Ile Val Met Thr Ala Asn Gln Val Leu Phe Lys Ala Glu
            180                 185                 190

His Leu Leu Phe Phe Ser Arg Leu Leu Asp Gly Asn Tyr Pro Glu Thr
        195                 200                 205

Ala Arg Leu Ile Pro Thr Glu Ser Lys Thr Thr Met Ile Val Asn Ala
    210                 215                 220

Lys Glu Phe Leu Gln Ala Ile Asp Arg Ala Ser Leu Leu Ala Arg Glu
225                 230                 235                 240

Gly Arg Asn Asn Val Val Lys Leu Thr Thr Leu Pro Gly Gly Met Leu
                245                 250                 255

Glu Ile Ser Ser Ile Ser Pro Glu Ile Gly Lys Val Thr Glu Gln Leu
            260                 265                 270

Gln Thr Glu Ser Leu Glu Gly Glu Glu Leu Asn Ile Ser Phe Ser Ala
        275                 280                 285

Lys Tyr Met Met Asp Ala Leu Arg Ala Leu Asp Gly Thr Asp Ile Gln
    290                 295                 300

Ile Ser Phe Thr Gly Ala Met Arg Pro Phe Leu Leu Arg Pro Leu His
305                 310                 315                 320

Thr Asp Ser Met Leu Gln Leu Ile Leu Pro Val Arg Thr Tyr
                325                 330
```

<210> 175
<211> 492
<212> DNA
<213> Bacillus stearothermophilus

<400> 175

```
atgattaacc gcgtcatttt ggtcggcagg ttaacgagag atccggagtt gcgttacact 60
ccaagcggag tggctgttgc cacgtttacg ctcgcggtca accgtccgtt tacaaatcag 120
cagggcgagc gggaaacgga ttttattcaa tgtgtcgttt ggcgccgcca ggcggaaaac 180
gtcgccaact ttttgaaaaa ggggagcttg gctggtgtcg atggccgact gcaaacccgc 240
agctatgaaa atcaagaagg tcggcgtgtg tacgtgacgg aagtggtggc tgatagcgtc 300
caatttcttg agccgaaagg aacgagcgag cagcgagggg cgacagcagg cggctactat 360
ggggatccat tcccattcgg gcaagatcag aaccaccaat atccgaacga aaaagggttt 420
ggccgcatcg atgacgatcc tttcgccaat gacggccagc cgatcgatat ttctgatgat 480
gatttgccgt tt                                                     492
```

<210> 176
<211> 164
<212> PRT
<213> Bacillus stearothermophilus

<400> 176

```
Met Ile Asn Arg Val Ile Leu Val Gly Arg Leu Thr Arg Asp Pro Glu
  1               5                  10                  15

Leu Arg Tyr Thr Pro Ser Gly Val Ala Val Ala Thr Phe Thr Leu Ala
             20                  25                  30

Val Asn Arg Pro Phe Thr Asn Gln Ser Tyr Glu Asn Gln Glu Gly Arg
         35                  40                  45

Arg Val Tyr Val Thr Glu Val Val Ala Asp Ser Val Gln Phe Leu Glu
     50                  55                  60

Pro Lys Gly Thr Ser Glu Gln Arg Gly Ala Thr Ala Gly Gly Tyr Tyr
 65                  70                  75                  80

Gln Gly Glu Arg Glu Thr Asp Phe Ile Gln Cys Val Val Trp Arg Arg
                 85                  90                  95

Gln Ala Glu Asn Val Ala Asn Phe Leu Lys Lys Gly Ser Leu Ala Gly
            100                 105                 110

Val Asp Gly Arg Leu Gln Thr Arg Gly Asp Pro Phe Pro Phe Gly Gln
        115                 120                 125

Asp Gln Asn His Gln Tyr Pro Asn Glu Lys Gly Phe Gly Arg Ile Asp
    130                 135                 140

Asp Asp Pro Phe Ala Asn Asp Gly Gln Pro Ile Asp Ile Ser Asp Asp
145                 150                 155                 160

Asp Leu Pro Phe
```

<210> 177
<211> 1044
<212> DNA
<213> Bacillus stearothermophilus

<400> 177
atgctggaac gcgtatgggg aaacattgaa aaacggcgtt tttctcccct ttatttatta 60
tacggcaatg agccgttttt attaacggaa acgtatgagc gattggtgaa cgcagcgctt 120
ggccccgagg agcgggagtg gaacttggct gtgtacgact gcgaggaaac gccgatcgag 180
gcggcgcttg aggaggccga gacggtgccg tttttcggcg agcggcgtgt cattctcatc 240
aagcatccat atttttttac gtctgaaaaa gagaaggaga tcgaacatga tttggcgaag 300
ctggaggcgt acttgaaggc gccgtcgccg ttttcgatcg tcgtcttttt cgcgccgtac 360
gagaagcttg atgagcgaaa aaaaattacg aagctcgcca aagagcaaag cgaagtcgtc 420
atcgccgccc cgctcgccga agcggagctg cgtgcctggg tgcggcgccg catcgagagc 480
caaggggcgc aagcaagcga cgaggcgatt gatgtcctgt tgcggcgggc cgggacgcag 540
ctttccgcct tggcgaatga aatcgataaa ttggccctgt ttgccggatc gggcggaacc 600
atcgaggcgg cggcggttga gcggcttgtc gcccgcacgc cggaagaaaa cgtatttgtg 660
cttgtcgagc aagtggcgaa gcgcgacatt ccagcagcgt tgcagacgtt ttatgatctg 720
cttgaaaaca atgaagagcc gatcaaaatt ttggcgttgc tcgccgccca tttccgcttg 780
ctttcgcaag tgaaatggct tgcctcctta ggctacggac aggcgcaaat tgctgcggcg 840
ctcaaggtgc acccgttccg cgtcaagctc gctcttgctc aagcggcccg cttcgctgac 900
ggagagcttg ctgaggcgat caacgagctc gctgacgccg attacgaagt gaaaagcggg 960
gcggtcgatc gccggttggc cgttgagctg cttctgatgc gctggggcgc ccgcccggcg 1020
caagcggggc gccacggccg gcgg 1044

<210> 178
<211> 348
<212> PRT
<213> Bacillus stearothermophilus

<400> 178
Met Leu Glu Arg Val Trp Gly Asn Ile Glu Lys Arg Arg Phe Ser Pro
1 5 10 15

Leu Tyr Leu Leu Tyr Gly Asn Glu Pro Phe Leu Leu Thr Glu Thr Tyr
20 25 30

Glu Arg Leu Val Asn Ala Ala Leu Gly Pro Glu Glu Arg Glu Trp Asn
35 40 45

Leu Ala Val Tyr Asp Cys Glu Glu Thr Pro Ile Glu Ala Ala Leu Glu
50 55 60

Glu Ala Glu Thr Val Pro Phe Phe Gly Glu Arg Arg Val Ile Leu Ile

65 70 75 80

Lys His Pro Tyr Phe Phe Thr Ser Glu Lys Glu Lys Glu Ile Glu His
85 90 95

Asp Leu Ala Lys Leu Glu Ala Tyr Leu Lys Ala Pro Ser Pro Phe Ser
100 105 110

Ile Val Val Phe Phe Ala Pro Tyr Glu Lys Leu Asp Glu Arg Lys Lys
115 120 125

Ile Thr Lys Leu Ala Lys Glu Gln Ser Glu Val Val Ile Ala Ala Pro
130 135 140

Leu Ala Glu Ala Glu Leu Arg Ala Trp Val Arg Arg Arg Ile Glu Ser
145 150 155 160

Gln Gly Ala Gln Ala Ser Asp Glu Ala Ile Asp Val Leu Leu Arg Arg
165 170 175

Ala Gly Thr Gln Leu Ser Ala Leu Ala Asn Glu Ile Asp Lys Leu Ala
180 185 190

Leu Phe Ala Gly Ser Gly Gly Thr Ile Glu Ala Ala Ala Val Glu Arg
195 200 205

Leu Val Ala Arg Thr Pro Glu Glu Asn Val Phe Val Leu Val Glu Gln
210 215 220

Val Ala Lys Arg Asp Ile Pro Ala Ala Leu Gln Thr Phe Tyr Asp Leu
225 230 235 240

Leu Glu Asn Asn Glu Glu Pro Ile Lys Ile Leu Ala Leu Leu Ala Ala
245 250 255

His Phe Arg Leu Leu Ser Gln Val Lys Trp Leu Ala Ser Leu Gly Tyr
260 265 270

Gly Gln Ala Gln Ile Ala Ala Ala Leu Lys Val His Pro Phe Arg Val
275 280 285

Lys Leu Ala Leu Ala Gln Ala Ala Arg Phe Ala Asp Gly Glu Leu Ala
290 295 300

Glu Ala Ile Asn Glu Leu Ala Asp Ala Asp Tyr Glu Val Lys Ser Gly
305 310 315 320

Ala Val Asp Arg Arg Leu Ala Val Glu Leu Leu Leu Met Arg Trp Gly

325 330 335

Ala Arg Pro Ala Gln Ala Gly Arg His Gly Arg Arg
340 345

<210> 179
<211> 757
<212> DNA
<213> Bacillus stearothermophilus

<400> 179
atgcgatggg aacagctagc gaaacgccag ccggtggtgg cgaaaatgct gcaaagcggc 60
ttggaaaaag ggcggatttc tcatgcgtac ttgtttgagg ggcagcgggg gacgggcaaa 120
aaagcggcca gtttgttgtt ggcgaaacgt ttgttttgtc tgtccccaat cggagtttcc 180
ccgtgtctag agtgccgcaa ctgccggcgc atcgactccg gcaaccaccc tgacgtccgg 240
gtgatcggcc cagatggagg atcaatcaaa aaggaacaaa tcgaatggct gcagcaagag 300
ttctcgaaaa cagcggtcga gtcggataaa aaaatgtaca tcgttgagca cgccgatcaa 360
atgacgacaa gcgctgccaa cagccttctg aaatttttgg aagagccgca tccggggacg 420
gtggcggtat tgctgactga gcaataccac cgcctgctag ggacgatcgt ttcccgctgt 480
caagtgcttt cgttccggcc gttgccgccg gcagagctcg cccagggact tgtcgaggag 540
cacgtgccgt tgccgttggc gctgttggct gcccatttga caaacagctt cgaggaagca 600
ctggcgcttg ccaaagatag ttggtttgcc gaggcgcgaa cattagtgct acaatggtat 660
gagatgctgg gcaagccgga gctgcagctt ttgtttttca tccacgaccg cttgtttccg 720
catttttgg aaagccatca gcttgacctt ggacttg 757

<210> 180
<211> 252
<212> PRT
<213> Bacillus stearothermophilus

<400> 180
Met Arg Trp Glu Gln Leu Ala Lys Arg Gln Pro Val Val Ala Lys Met
1 5 10 15

Leu Gln Ser Gly Leu Glu Lys Gly Arg Ile Ser His Ala Tyr Leu Phe
20 25 30

Glu Gly Gln Arg Gly Thr Gly Lys Lys Ala Ala Ser Leu Leu Leu Ala
35 40 45

Lys Arg Leu Phe Cys Leu Ser Pro Ile Gly Val Ser Pro Cys Leu Glu
50 55 60

Cys Arg Asn Cys Arg Arg Ile Asp Ser Gly Asn His Pro Asp Val Arg
65 70 75 80

```
Val Ile Gly Pro Asp Gly Gly Ser Ile Lys Lys Glu Gln Ile Glu Trp
                 85                  90                  95

Leu Gln Gln Glu Phe Ser Lys Thr Ala Val Glu Ser Asp Lys Lys Met
            100                 105                 110

Tyr Ile Val Glu His Ala Asp Gln Met Thr Thr Ser Ala Ala Asn Ser
        115                 120                 125

Leu Leu Lys Phe Leu Glu Glu Pro His Pro Gly Thr Val Ala Val Leu
    130                 135                 140

Leu Thr Glu Gln Tyr His Arg Leu Leu Gly Thr Ile Val Ser Arg Cys
145                 150                 155                 160

Gln Val Leu Ser Phe Arg Pro Leu Pro Pro Ala Glu Leu Ala Gln Gly
                165                 170                 175

Leu Val Glu Glu His Val Pro Leu Pro Leu Ala Leu Leu Ala Ala His
            180                 185                 190

Leu Thr Asn Ser Phe Glu Glu Ala Leu Ala Leu Ala Lys Asp Ser Trp
        195                 200                 205

Phe Ala Glu Ala Arg Thr Leu Val Leu Gln Trp Tyr Glu Met Leu Gly
    210                 215                 220

Lys Pro Glu Leu Gln Leu Leu Phe Phe Ile His Asp Arg Leu Phe Pro
225                 230                 235                 240

His Phe Leu Glu Ser His Gln Leu Asp Leu Gly Leu
                245                 250
```

<210> 181
<211> 1677
<212> DNA
<213> Bacillus stearothermophilus

<400> 181
gtggcatacc aagcgttata tcgcgtgttt cggccgcagc gctttgcgga catggtcggc 60
caagaacacg tgaccaagac gttgcaaagc gccctgcttc aacataaaat atcgcacgct 120
tacttatttt ccggcccgcg cggtacagga aaaacgagcg cagcgaaaat tttcgccaag 180
gcggtcaact gtgaacaggc gccagcggcg gagccatgca atgagtgtcc agcttgcctc 240
ggcattacga atggaacggt tcccgatgtg ctggaaattg acgctgcttc caacaaccgc 300
gtcgatgaaa ttcgtgatat ccgtgagaag gtgaaatttg cgccaacgtc ggcccgctac 360
aaagtgtata tcatcgacga ggtgcatatg ctgtcgatcg gtgcgtttaa cgcgctgttg 420
aaaacgttgg aggagccgcc gaaacacgtc attttcattt tggccacgac cgagccgcac 480

aaaattccgg cgacgatcat ttcccgctgc caacggttcg attttcgccg catcccgctt 540
caggcgatcg tttcacggct aaagtacgtc gcaagcgccc aaggtgtcga ggcgtcagat 600
gaggcattgt ccgccatcgc ccgtgctgca gacgggggga tgcgcgatgc gctcagcttg 660
cttgatcaag ccatttcgtt cagcgacggg aaacttcggc tcgacgacgt gctggcgatg 720
accggggctg catcatttgc cgccttatcg agcttcatcg aagccatcca ccgcaaagat 780
acagcggcgg ttcttcagca cttggaaacg atgatggcgc aagggaaaga tccgcatcgt 840
ttggttgaag acttgatttt gtactatcgc gatttattgc tgtacaaaac cgctccctat 900
gtggagggag cgattcaaat tgctgtcgtt gacgaagcgt tcacttcact gtcggaaatg 960
attccggttt ccaatttata cgaggccatc gagttgctga acaaaagcca gcaagagatg 1020
aagtggacaa accacccgcg ccttctgttg gaagtggcgc ttgtgaaact ttgccatcca 1080
tcagccgccg ccccgtcgct gtcggcttcc gagttggaac cgttgataaa gcggattgaa 1140
acgctggagg cggaattgcg gcgcctgaag gaacaaccgc ctgcccctcc gtcgaccgcc 1200
gcgccggtga aaaaactgtc caaaccgatg aaaacggggg gatataaagc cccggttggc 1260
cgcatttacg agctgttgaa acaggcgacg catgaagatt tagctttggt gaaaggatgc 1320
tgggcggatg tgctcgacac gttgaaacgg cagcataaag tgtcgcacgc tgccttgctg 1380
caagagagcg agccggttgc agcgagcgcc tcagcgtttg tattaaaatt caaatacgaa 1440
atccactgca aaatggcgac cgatcccaca agttcggtca aagaaaacgt cgaagcgatt 1500
ttgtttgagc tgacaaaccg ccgctttgaa atggtagcca ttccggaggg agaatgggga 1560
aaaataagag aagagttcat ccgcaataag gacgccatgg tggaaaaaag cgaagaagat 1620
ccgttaatcg ccgaagcgaa gcggctgttt ggcgaagagc tgatcgaaat taaagaa 1677

<210> 182
<211> 559
<212> PRT
<213> Bacillus stearothermophilus

<400> 182
Val Ala Tyr Gln Ala Leu Tyr Arg Val Phe Arg Pro Gln Arg Phe Ala
1 5 10 15

Asp Met Val Gly Gln Glu His Val Thr Lys Thr Leu Gln Ser Ala Leu
20 25 30

Leu Gln His Lys Ile Ser His Ala Tyr Leu Phe Ser Gly Pro Arg Gly
35 40 45

Thr Gly Lys Thr Ser Ala Ala Lys Ile Phe Ala Lys Ala Val Asn Cys
50 55 60

Glu Gln Ala Pro Ala Ala Glu Pro Cys Asn Glu Cys Pro Ala Cys Leu
65 70 75 80

Gly Ile Thr Asn Gly Thr Val Pro Asp Val Leu Glu Ile Asp Ala Ala
85 90 95

Ser Asn Asn Arg Val Asp Glu Ile Arg Asp Ile Arg Glu Lys Val Lys
100 105 110

```
Phe Ala Pro Thr Ser Ala Arg Tyr Lys Val Tyr Ile Ile Asp Glu Val
        115                 120                 125

His Met Leu Ser Ile Gly Ala Phe Asn Ala Leu Leu Lys Thr Leu Glu
    130                 135                 140

Glu Pro Pro Lys His Val Ile Phe Ile Leu Ala Thr Thr Glu Pro His
145                 150                 155                 160

Lys Ile Pro Ala Thr Ile Ile Ser Arg Cys Gln Arg Phe Asp Phe Arg
                165                 170                 175

Arg Ile Pro Leu Gln Ala Ile Val Ser Arg Leu Lys Tyr Val Ala Ser
            180                 185                 190

Ala Gln Gly Val Glu Ala Ser Asp Glu Ala Leu Ser Ala Ile Ala Arg
        195                 200                 205

Ala Ala Asp Gly Gly Met Arg Asp Ala Leu Ser Leu Leu Asp Gln Ala
    210                 215                 220

Ile Ser Phe Ser Asp Gly Lys Leu Arg Leu Asp Asp Val Leu Ala Met
225                 230                 235                 240

Thr Gly Ala Ala Ser Phe Ala Ala Leu Ser Ser Phe Ile Glu Ala Ile
                245                 250                 255

His Arg Lys Asp Thr Ala Ala Val Leu Gln His Leu Glu Thr Met Met
            260                 265                 270

Ala Gln Gly Lys Asp Pro His Arg Leu Val Glu Asp Leu Ile Leu Tyr
        275                 280                 285

Tyr Arg Asp Leu Leu Leu Tyr Lys Thr Ala Pro Tyr Val Glu Gly Ala
    290                 295                 300

Ile Gln Ile Ala Val Val Asp Glu Ala Phe Thr Ser Leu Ser Glu Met
305                 310                 315                 320

Ile Pro Val Ser Asn Leu Tyr Glu Ala Ile Glu Leu Leu Asn Lys Ser
                325                 330                 335

Gln Gln Glu Met Lys Trp Thr Asn His Pro Arg Leu Leu Leu Glu Val
            340                 345                 350

Ala Leu Val Lys Leu Cys His Pro Ser Ala Ala Ala Pro Ser Leu Ser
        355                 360                 365
```

```
Ala Ser Glu Leu Glu Pro Leu Ile Lys Arg Ile Glu Thr Leu Glu Ala
    370                 375                 380

Glu Leu Arg Arg Leu Lys Glu Gln Pro Pro Ala Pro Pro Ser Thr Ala
385                 390                 395                 400

Ala Pro Val Lys Lys Leu Ser Lys Pro Met Lys Thr Gly Gly Tyr Lys
                405                 410                 415

Ala Pro Val Gly Arg Ile Tyr Glu Leu Leu Lys Gln Ala Thr His Glu
            420                 425                 430

Asp Leu Ala Leu Val Lys Gly Cys Trp Ala Asp Val Leu Asp Thr Leu
        435                 440                 445

Lys Arg Gln His Lys Val Ser His Ala Ala Leu Leu Gln Glu Ser Glu
    450                 455                 460

Pro Val Ala Ala Ser Ala Ser Ala Phe Val Leu Lys Phe Lys Tyr Glu
465                 470                 475                 480

Ile His Cys Lys Met Ala Thr Asp Pro Thr Ser Ser Val Lys Glu Asn
                485                 490                 495

Val Glu Ala Ile Leu Phe Glu Leu Thr Asn Arg Arg Phe Glu Met Val
            500                 505                 510

Ala Ile Pro Glu Gly Glu Trp Gly Lys Ile Arg Glu Glu Phe Ile Arg
        515                 520                 525

Asn Lys Asp Ala Met Val Glu Lys Ser Glu Glu Asp Pro Leu Ile Ala
    530                 535                 540

Glu Ala Lys Arg Leu Phe Gly Glu Glu Leu Ile Glu Ile Lys Glu
545                 550                 555
```

<210> 183
<211> 4301
<212> DNA
<213> Bacillus stearothermophilus

<400> 183
atggtgacaa aagagcaaaa agagcggttt ctcatcctgc ttgagcagct gaagatgacg 60
tcggacgaat ggatgccgca ttttcgtgag gcagccattc gcaaagtcgt gatcgataaa 120
gaggagaaaa gctggcattt ttattttcag ttcgacaacg tgctgccggt tcatgtatac 180
aaaacgtttg ccgatcggct gcagacggcg ttccgccata tcgccgccgt ccgccatacg 240

atggaggtcg aagcgccgcg cgtaactgag gcggatgtgc aggcgtattg gccgctttgc 300
cttgccgagc tgcaagaagg catgtcgccg cttgtcgatt ggctcagccg gcagacgcct 360
gagctgaaag gaaacaagct gcttgtcgtt gcccgccatg aagcggaagc gctggcgatc 420
aaacggcggt tcgccaaaaa aatcgctgat gtgtacgctt cgtttgggtt tccccccctt 480
cagcttgacg tcagcgtcga gccgtccaag caagaaatgg aacagttttt ggcgcaaaaa 540
cagcaagagg acgaagagcg agcgcttgct gtactgaccg atttagcgag ggaagaagaa 600
aaggccgcgt ctgcgccgcc gtccggtccg cttgtcatcg gctatccgat ccgcgacgag 660
gagccggtgc ggcggcttga aacgatcgtc gaagaagagc ggcgcgtcgt tgtgcaaggc 720
tatgtatttg acgccgaagt gagcgaatta aaaagcggcc gcacgctgtt gaccatgaaa 780
atcacagatt acacgaactc gattttagtc aaaatgttct cgcgcgacaa agaggacgcc 840
gagcttatga gcggcgtcaa aaaaggcatg tgggtgaaag tgcgcggcag cgtgcaaaac 900
gatacgttcg tccgtgattt ggtcatcatc gccaacgatt tgaacgaaat cgccgcaaac 960
gaacggcaag atacggcgcc ggaaggggaa aagagggtcg agctccattt gcataccccg 1020
atgagccaaa tggacgcggt cacctcggtg acaaaactca ttgagcaagc gaaaaaatgg 1080
gggcatccgg cgatcgccgt caccgaccat gccgttgttc agtcgtttcc ggaggcctac 1140
agcgcggcga aaaaacacgg catgaaggtc atttacggcc ttgaggcgaa catcgtcgac 1200
gatggcgtgc cgatcgccta caatgagacg caccgccgtc tttcggagga aacgtacgtc 1260
gtctttgacg tcgagacgac gggcctgtcg gctgtgtaca atacgatcat tgagctggcg 1320
gcggtgaaag tgaaagacgg cgagatcatc gaccgattca tgtcgtttgc caaccctgga 1380
catccgttgt cggtgacaac gatggagctg actgggatca ccgatgagat ggtgaaagac 1440
gccccgaagc cggacgaggt gctagcccgt tttgttgact gggccggcga tgcgacgctt 1500
gttgcccaca acgccagctt tgacatcggt tttttaaacg cgggcctcgc tcgcatgggg 1560
cgcggcaaaa tcgcgaatcc agtcatcgat acgctcgagc tggcccgttt tttatacccg 1620
gatttgaaaa accatcggct caatacattg tgcaaaaaat ttgacattga attgacgcag 1680
catcaccgcg ccatctacga cgcggaggcg accgggcatt tgcttatgcg gctgttgaag 1740
gaagcggaag agcgcggcat actgtttcat gacgaattaa acagccgcac gcacagcgaa 1800
gcgtcctatc ggcttgcgcg cccgttccat gtgacgctgt tggcgcaaaa cgagactgga 1860
ttgaaaaatt tgttcaagct tgtgtcattg tcgcacattc aatattttca ccgtgtgccg 1920
cgcatcccgc gctccgtgct cgtcaagcac cgcgacggcc tgcttgtcgg ctcgggctgc 1980
gacaaaggag agctgtttga caacttgatc caaaaggcgc cggaagaagt cgaagacatc 2040
gcccgttttt acgattttct tgaagtgcat ccgccggacg tgtacaagcc gctcatcgag 2100
atggattatg tgaaagacga agagatgatc aaaaacatca tccgcagcat cgtcgccctt 2160
ggtgagaagc ttgacatccc ggttgtcgcc actggcaacg tccattactt gaacccagaa 2220
gataaaattt accggaaaat cttaatccat tcgcaaggcg gggcgaatcc gctcaaccgc 2280
catgaactgc cggatgtata tttccgtacg acgaatgaaa tgcttgactg cttctcgttt 2340
ttagggccgg aaaaagcgaa ggaaatcgtc gttgacaaca cgcaaaaaat cgcttcgtta 2400
atcggcgatg tcaagccgat caaagatgag ctgtatacgc cgcgcattga aggggcggac 2460
gaggaaatca gggaaatgag ctaccggcgg gcgaaggaaa tttacggcga cccgttgccg 2520
aaacttgttg aagagcggct tgagaaggag ctaaaaagca tcatcggcca tggctttgcc 2580
gtcatttatt tgatctcgca caagcttgtg aaaaaatcgc tcgatgacgg ctaccttgtc 2640
gggtcgcgcg gatcggtcgg ctcgtcgttt gtcgcgacga tgacggaaat caccgaggtc 2700
aatccgctgc cgccgcatta cgtttgcccg aactgcaagc attcggagtt ctttaacgac 2760
ggttcagtcg gctcagggtt tgatttgccg gataaaaact gcccgcgatg tgggacgaaa 2820
tacaagaaag acgggcacga catcccgttt gagacgtttc tcggctttaa aggcgacaaa 2880
gtgccggata tcgacttgaa cttttccggc gaataccagc cgcgcgccca caactatacg 2940
aaagtgctgt ttggcgaaga caacgtctac cgcgccggga cgattggcac ggtcgctgac 3000
aaaacggcgt acggatttgt caaagcgtat gcgagcgacc ataacttaga gctgcgcggc 3060
gcggaaatcg acggctcgcg gctggctgca ccggggtgaa gcggacgacc gggcagcatc 3120

cgggcggcat catcgtcgtc ccggattata tggaaattta cgattttacg ccgattcaat 3180
atccggccga tgacacgtcc tctgaatggc ggacgaccca tttcgacttc cattcgatcc 3240
acgacaattt gttgaagctc gatattctcg ggcacgacga tccgacggtc attcgcatgc 3300
tgcaagattt aagcggcatc gatccgaaaa cgatcccgac cgacgacccg gatgtgatgg 3360
gcatttttcag cagcaccgag ccgcttggcg ttacgccgga gcaaatcatg tgcaatgtcg 3420
gcacgatcgg cattccggag tttggcacgc gcttcgttcg gcaaatgttg gaagagacaa 3480
ggccaaaaac gttttccgaa ctcgtgcaaa tttccggctt gtcgcacggc accgatgtgt 3540
ggctcggcaa cgcgcaagag ctcattcaaa acggcacgtg tacgttatcg gaagtcatcg 3600
gctgccgcga cgacattatg gtctatttga tttaccgcgg gctcgagccg tcgctcgctt 3660
ttaaaatcat ggaatccgtg cgcaaaggaa aaggcttaac gccggagttt gaagcagaaa 3720
tgcgcaaaca tgacgtgccg gagtggtaca tcgattcatg caaaaaaatc aagtacatgt 3780
tcccgaaagc gcacgccgcc gcctacgtgt taatggcggt gcgcatcgcc tactttaagg 3840
tgcaccatcc gcttttgtat tacgcgtcgt actttacggt gcgggcggag gactttgacc 3900
ttgacgccat gatcaaagga tcacccgcca ttcgcaagcg gattgaggaa atcaacgcca 3960
aaggcattca ggcgacggcg aaagaaaaaa gcttgctcac ggttcttgag gtggccttag 4020
agatgtgcga gcgcggcttt tcctttaaaa atatcgattt gtaccgctcg caggcgacgg 4080
aattcgtcat tgacggcaat tctctcattc cgccgttcaa cgccattccg gggcttggga 4140
cgaacgtggc gcaggcgatc gtgcgcgccc gcgaggaagg cgagtttttg tcgaaggagg 4200
atttgcaaca gcgcggcaaa ttgtcgaaaa cgctgctcga gtatctagaa agccgcggct 4260
gccttgactc gcttccagac cataaccagc tgtcgctgtt t 4301

<210> 184
<211> 1433
<212> PRT
<213> Bacillus stearothermophilus

<400> 184
Met Val Thr Lys Glu Gln Lys Glu Arg Phe Leu Ile Leu Leu Glu Gln
1 5 10 15

Leu Lys Met Thr Ser Asp Glu Trp Met Pro His Phe Arg Glu Ala Ala
20 25 30

Ile Arg Lys Val Val Ile Asp Lys Glu Glu Lys Ser Trp His Phe Tyr
35 40 45

Phe Gln Phe Asp Asn Val Leu Pro Val His Val Tyr Lys Thr Phe Ala
50 55 60

Asp Arg Leu Gln Thr Ala Phe Arg His Ile Ala Ala Val Arg His Thr
65 70 75 80

Met Glu Val Glu Ala Pro Arg Val Thr Glu Ala Asp Val Gln Ala Tyr
85 90 95

Trp Pro Leu Cys Leu Ala Glu Leu Gln Glu Gly Met Ser Pro Leu Val
100 105 110

Asp Trp Leu Ser Arg Gln Thr Pro Glu Leu Lys Gly Asn Lys Leu Leu
115 120 125

Val Val Ala Arg His Glu Ala Glu Ala Leu Ala Ile Lys Arg Arg Phe
130 135 140

Ala Lys Lys Ile Ala Asp Val Tyr Ala Ser Phe Gly Phe Pro Pro Leu
145 150 155 160

Gln Leu Asp Val Ser Val Glu Pro Ser Lys Gln Glu Met Glu Gln Phe
165 170 175

Leu Ala Gln Lys Gln Gln Glu Asp Glu Glu Arg Ala Leu Ala Val Leu
180 185 190

Thr Asp Leu Ala Arg Glu Glu Glu Lys Ala Ala Ser Ala Pro Pro Ser
195 200 205

Gly Pro Leu Val Ile Gly Tyr Pro Ile Arg Asp Glu Glu Pro Val Arg
210 215 220

Arg Leu Glu Thr Ile Val Glu Glu Glu Arg Arg Val Val Val Gln Gly
225 230 235 240

Tyr Val Phe Asp Ala Glu Val Ser Glu Leu Lys Ser Gly Arg Thr Leu
245 250 255

Leu Thr Met Lys Ile Thr Asp Tyr Thr Asn Ser Ile Leu Val Lys Met
260 265 270

Phe Ser Arg Asp Lys Glu Asp Ala Glu Leu Met Ser Gly Val Lys Lys
275 280 285

Gly Met Trp Val Lys Val Arg Gly Ser Val Gln Asn Asp Thr Phe Val
290 295 300

Arg Asp Leu Val Ile Ile Ala Asn Asp Leu Asn Glu Ile Ala Ala Asn
305 310 315 320

Glu Arg Gln Asp Thr Ala Pro Glu Gly Glu Lys Arg Val Glu Leu His
325 330 335

Leu His Thr Pro Met Ser Gln Met Asp Ala Val Thr Ser Val Thr Lys
340 345 350

Leu Ile Glu Gln Ala Lys Lys Trp Gly His Pro Ala Ile Ala Val Thr
355 360 365

```
Asp His Ala Val Val Gln Ser Phe Pro Glu Ala Tyr Ser Ala Ala Lys
    370                 375                 380

Lys His Gly Met Lys Val Ile Tyr Gly Leu Glu Ala Asn Ile Val Asp
385                 390                 395                 400

Asp Gly Val Pro Ile Ala Tyr Asn Glu Thr His Arg Arg Leu Ser Glu
                405                 410                 415

Glu Thr Tyr Val Val Phe Asp Val Glu Thr Thr Gly Leu Ser Ala Val
            420                 425                 430

Tyr Asn Thr Ile Ile Glu Leu Ala Ala Val Lys Val Lys Asp Gly Glu
        435                 440                 445

Ile Ile Asp Arg Phe Met Ser Phe Ala Asn Pro Gly His Pro Leu Ser
    450                 455                 460

Val Thr Thr Met Glu Leu Thr Gly Ile Thr Asp Glu Met Val Lys Asp
465                 470                 475                 480

Ala Pro Lys Pro Asp Glu Val Leu Ala Arg Phe Val Asp Trp Ala Gly
                485                 490                 495

Asp Ala Thr Leu Val Ala His Asn Ala Ser Phe Asp Ile Gly Phe Leu
            500                 505                 510

Asn Ala Gly Leu Ala Arg Met Gly Arg Gly Lys Ile Ala Asn Pro Val
        515                 520                 525

Ile Asp Thr Leu Glu Leu Ala Arg Phe Leu Tyr Pro Asp Leu Lys Asn
    530                 535                 540

His Arg Leu Asn Thr Leu Cys Lys Lys Phe Asp Ile Glu Leu Thr Gln
545                 550                 555                 560

His His Arg Ala Ile Tyr Asp Ala Glu Ala Thr Gly His Leu Leu Met
                565                 570                 575

Arg Leu Leu Lys Glu Ala Glu Glu Arg Gly Ile Leu Phe His Asp Glu
            580                 585                 590

Leu Asn Ser Arg Thr His Ser Glu Ala Ser Tyr Arg Leu Ala Arg Pro
        595                 600                 605

Phe His Val Thr Leu Leu Ala Gln Asn Glu Thr Gly Leu Lys Asn Leu
    610                 615                 620
```

Phe Lys Leu Val Ser Leu Ser His Ile Gln Tyr Phe His Arg Val Pro
625 630 635 640

Arg Ile Pro Arg Ser Val Leu Val Lys His Arg Asp Gly Leu Leu Val
645 650 655

Gly Ser Gly Cys Asp Lys Gly Glu Leu Phe Asp Asn Leu Ile Gln Lys
660 665 670

Ala Pro Glu Glu Val Glu Asp Ile Ala Arg Phe Tyr Asp Phe Leu Glu
675 680 685

Val His Pro Pro Asp Val Tyr Lys Pro Leu Ile Glu Met Asp Tyr Val
690 695 700

Lys Asp Glu Glu Met Ile Lys Asn Ile Ile Arg Ser Ile Val Ala Leu
705 710 715 720

Gly Glu Lys Leu Asp Ile Pro Val Val Ala Thr Gly Asn Val His Tyr
725 730 735

Leu Asn Pro Glu Asp Lys Ile Tyr Arg Lys Ile Leu Ile His Ser Gln
740 745 750

Gly Gly Ala Asn Pro Leu Asn Arg His Glu Leu Pro Asp Val Tyr Phe
755 760 765

Arg Thr Thr Asn Glu Met Leu Asp Cys Phe Ser Phe Leu Gly Pro Glu
770 775 780

Lys Ala Lys Glu Ile Val Val Asp Asn Thr Gln Lys Ile Ala Ser Leu
785 790 795 800

Ile Gly Asp Val Lys Pro Ile Lys Asp Glu Leu Tyr Thr Pro Arg Ile
805 810 815

Glu Gly Ala Asp Glu Glu Ile Arg Glu Met Ser Tyr Arg Arg Ala Lys
820 825 830

Glu Ile Tyr Gly Asp Pro Leu Pro Lys Leu Val Glu Glu Arg Leu Glu
835 840 845

Lys Glu Leu Lys Ser Ile Ile Gly His Gly Phe Ala Val Ile Tyr Leu
850 855 860

Ile Ser His Lys Leu Val Lys Lys Ser Leu Asp Asp Gly Tyr Leu Val
865 870 875 880

Gly Ser Arg Gly Ser Val Gly Ser Ser Phe Val Ala Thr Met Thr Glu
885 890 895

Ile Thr Glu Val Asn Pro Leu Pro Pro His Tyr Val Cys Pro Asn Cys
900 905 910

Lys His Ser Glu Phe Phe Asn Asp Gly Ser Val Gly Ser Gly Phe Asp
915 920 925

Leu Pro Asp Lys Asn Cys Pro Arg Cys Gly Thr Lys Tyr Lys Lys Asp
930 935 940

Gly His Asp Ile Pro Phe Glu Thr Phe Leu Gly Phe Lys Gly Asp Lys
945 950 955 960

Val Pro Asp Ile Asp Leu Asn Phe Ser Gly Glu Tyr Gln Pro Arg Ala
965 970 975

His Asn Tyr Thr Lys Val Leu Phe Gly Glu Asp Asn Val Tyr Arg Ala
980 985 990

Gly Thr Ile Gly Thr Val Ala Asp Lys Thr Ala Tyr Gly Phe Val Lys
995 1000 1005

Ala Tyr Ala Ser Asp His Asn Leu Glu Leu Arg Gly Ala Glu Ile Asp
1010 1015 1020

Leu Ala Ala Gly Cys Thr Gly Val Lys Arg Thr Thr Gly Gln His Pro
1025 1030 1035 1040

Gly Gly Ile Ile Val Val Pro Asp Tyr Met Glu Ile Tyr Asp Phe Thr
1045 1050 1055

Pro Ile Gln Tyr Pro Ala Asp Asp Thr Ser Ser Glu Trp Arg Thr Thr
1060 1065 1070

His Phe Asp Phe His Ser Ile His Asp Asn Leu Leu Lys Leu Asp Ile
1075 1080 1085

Leu Gly His Asp Asp Pro Thr Val Ile Arg Met Leu Gln Asp Leu Ser
1090 1095 1100

Gly Ile Asp Pro Lys Thr Ile Pro Thr Asp Asp Pro Asp Val Met Gly
1105 1110 1115 1120

Ile Phe Ser Ser Thr Glu Pro Leu Gly Val Thr Pro Glu Gln Ile Met
1125 1130 1135

Cys Asn Val Gly Thr Ile Gly Ile Pro Glu Phe Gly Thr Arg Phe Val
1140 1145 1150

Arg Gln Met Leu Glu Glu Thr Arg Pro Lys Thr Phe Ser Glu Leu Val
1155 1160 1165

Gln Ile Ser Gly Leu Ser His Gly Thr Asp Val Trp Leu Gly Asn Ala
1170 1175 1180

Gln Glu Leu Ile Gln Asn Gly Thr Cys Thr Leu Ser Glu Val Ile Gly
1185 1190 1195 1200

Cys Arg Asp Asp Ile Met Val Tyr Leu Ile Tyr Arg Gly Leu Glu Pro
1205 1210 1215

Ser Leu Ala Phe Lys Ile Met Glu Ser Val Arg Lys Gly Lys Gly Leu
1220 1225 1230

Thr Pro Glu Phe Glu Ala Glu Met Arg Lys His Asp Val Pro Glu Trp
1235 1240 1245

Tyr Ile Asp Ser Cys Lys Lys Ile Lys Tyr Met Phe Pro Lys Ala His
1250 1255 1260

Ala Ala Ala Tyr Val Leu Met Ala Val Arg Ile Ala Tyr Phe Lys Val
1265 1270 1275 1280

His His Pro Leu Leu Tyr Tyr Ala Ser Tyr Phe Thr Val Arg Ala Glu
1285 1290 1295

Asp Phe Asp Leu Asp Ala Met Ile Lys Gly Ser Pro Ala Ile Arg Lys
1300 1305 1310

Arg Ile Glu Glu Ile Asn Ala Lys Gly Ile Gln Ala Thr Ala Lys Glu
1315 1320 1325

Lys Ser Leu Leu Thr Val Leu Glu Val Ala Leu Glu Met Cys Glu Arg
1330 1335 1340

Gly Phe Ser Phe Lys Asn Ile Asp Leu Tyr Arg Ser Gln Ala Thr Glu
1345 1350 1355 1360

Phe Val Ile Asp Gly Asn Ser Leu Ile Pro Pro Phe Asn Ala Ile Pro
1365 1370 1375

Gly Leu Gly Thr Asn Val Ala Gln Ala Ile Val Arg Ala Arg Glu Glu
1380 1385 1390

Gly Glu Phe Leu Ser Lys Glu Asp Leu Gln Gln Arg Gly Lys Leu Ser
1395 1400 1405

Lys Thr Leu Leu Glu Tyr Leu Glu Ser Arg Gly Cys Leu Asp Ser Leu
1410 1415 1420

Pro Asp His Asn Gln Leu Ser Leu Phe
1425 1430

<210> 185
<211> 199
<212> PRT
<213> Thermus thermophilus

<400> 185
Thr Pro Lys Gly Lys Asp Leu Val Arg His Leu Glu Asn Arg Ala Lys
1 5 10 15

Arg Leu Gly Leu Arg Leu Pro Gly Gly Val Ala Gln Tyr Leu Ala Ser
20 25 30

Leu Glu Gly Asp Leu Glu Ala Leu Glu Arg Glu Leu Glu Lys Leu Ala
35 40 45

Leu Leu Ser Pro Pro Leu Thr Leu Glu Lys Val Glu Lys Val Val Ala
50 55 60

Leu Arg Pro Pro Leu Thr Gly Phe Asp Leu Val Arg Ser Val Leu Glu
65 70 75 80

Lys Asp Pro Lys Glu Ala Leu Leu Arg Leu Gly Arg Leu Lys Glu Glu
85 90 95

Gly Glu Glu Pro Leu Arg Leu Leu Gly Ala Leu Ser Trp Gln Phe Ala
100 105 110

Leu Leu Ala Arg Ala Phe Phe Leu Leu Arg Glu Met Pro Arg Pro Lys
115 120 125

Glu Glu Asp Leu Ala Arg Leu Glu Ala His Pro Tyr Ala Ala Lys Lys
130 135 140

Ala Leu Leu Glu Ala Ala Arg Arg Leu Thr Glu Glu Ala Leu Lys Glu
145 150 155 160

Ala Leu Asp Ala Leu Met Glu Ala Glu Lys Arg Ala Lys Gly Gly Lys

165 170 175

Asp Pro Trp Leu Ala Leu Glu Ala Ala Val Leu Arg Leu Ala Arg Pro
180 185 190

Ala Gly Gln Pro Arg Val Asp
195

<210> 186
<211> 27
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: PCR primer

<400> 186
gcccagtacc tcgcctccct cgagggg 27

<210> 187
<211> 27
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: PCR primer

<400> 187
ggccccccttg gccttctcgg cctccat 27

<210> 188
<211> 331
<212> DNA
<213> Thermus thermophilus

<400> 188
agactcgagg ccctggagcg ggagctggag aagcttgccc tcctctcccc acccctcacc 60
ctggagaagg tggagaaggt ggtggccctg aggccccccc tcacgggctt tgacctggtg 120
cgctccgtcc tggagaagga ccccaaggag gccctcctgc gcctcaggcg cctcagggag 180
gagggggagg agcccctcag gctcctcggg gccctctcct ggcagttcgc cctcctcgcc 240
cgggccttct tcctcctccg ggaaaacccc aggcccaagg aggaggacct cgcccgcctc 300
gaggcccacc cctacgccgc caagaaggcc a 331

<210> 189

<211> 110
<212> PRT
<213> Thermus thermophilus

<400> 189
Arg Leu Glu Ala Leu Glu Arg Glu Leu Glu Lys Leu Ala Leu Leu Ser
1 5 10 15

Pro Pro Leu Thr Leu Glu Lys Val Glu Lys Val Val Ala Leu Arg Pro
20 25 30

Pro Leu Thr Gly Phe Asp Leu Val Arg Ser Val Leu Glu Lys Asp Pro
35 40 45

Lys Glu Ala Leu Leu Arg Leu Arg Arg Leu Arg Glu Glu Gly Glu Glu
50 55 60

Pro Leu Arg Leu Leu Gly Ala Leu Ser Trp Gln Phe Ala Leu Leu Ala
65 70 75 80

Arg Ala Phe Phe Leu Leu Arg Glu Asn Pro Arg Pro Lys Glu Glu Asp
85 90 95

Leu Ala Arg Leu Glu Ala His Pro Tyr Ala Ala Lys Lys Ala
100 105 110

<210> 190
<211> 31
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: PCR primer

<400> 190
gtggtgtcta gacatcataa cggttctggc a 31

<210> 191
<211> 27
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: PCR Primer

<400> 191

gagggccacc accttctcca ccttctc 27

<210> 192
<211> 25
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: PCR Primer

<400> 192
ctccgtcctg gagaaggacc ccaag 25

<210> 193
<211> 29
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: PCR primer

<220>
<221> primer_bind
<222> (15)
<223> S at position 15 can be either C or G

<220>
<221> primer_bind
<222> (27)
<223> S at position 27 can be either C or G

<400> 193
cgcgaattca acgcsctcct caagacsct 29

<210> 194
<211> 31
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: PCR primer

<400> 194
gacacttaac atatggtcat cgccttcacc g 31

<210> 195
<211> 38
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: PCR primer

<400> 195
gtgtgtgaat tcgggtcaac gggcgaggcg gaggaccg 38

<210> 196
<211> 10
<212> PRT
<213> Deinococcus radiodurans

<400> 196
Val Ile Leu Asn Pro Gly Ser Val Gly Gln
1 5 10

<210> 197
<211> 10
<212> PRT
<213> Methanococcus jannaschii

<400> 197
Tyr Leu Ile Asn Pro Gly Ser Val Gly Gln
1 5 10

<210> 198
<211> 10
<212> PRT
<213> Thermotoga maritima

<400> 198
Leu Val Leu Asn Pro Gly Ser Ala Gly Arg
1 5 10

<210> 199
<211> 28
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: PCR primer

<400> 199
ctggtgaacc cgggctccgt gggccagc 28

<210> 200
<211> 10
<212> PRT
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: polypeptide

<400> 200
Leu Leu Val Asn Pro Gly Ser Val Gly Gln
1 5 10

<210> 201
<211> 27
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: PCR primer

<400> 201
ctcgaggagc ttgaggaggg tgttggc 27

<210> 202
<211> 9
<212> PRT
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: polypeptide

<400> 202
Ala Asn Thr Leu Leu Lys Leu Leu Glu
1 5

<210> 203
<211> 32
<212> PRT

<213> Deinococcus radiodurans

<400> 203
Gly Phe Gly Gly Val Gln Leu His Ala Ala His Gly Tyr Leu Leu Ser
1 5 10 15

Gln Phe Leu Ser Pro Arg His Asn Val Arg Glu Asp Glu Tyr Gly Gly
20 25 30

<210> 204
<211> 32
<212> PRT
<213> Caenorhabditis elegans

<400> 204
Gly Phe Asp Gly Ile Gln Leu His Gly Ala His Gly Tyr Leu Leu Ser
1 5 10 15

Gln Phe Thr Ser Pro Thr Thr Asn Lys Arg Val Asp Lys Tyr Gly Gly
20 25 30

<210> 205
<211> 32
<212> PRT
<213> Pseudomonas aeruginosa

<400> 205
Gly Phe Ser Gly Val Glu Ile His Ala Ala His Gly Tyr Leu Leu Ser
1 5 10 15

Gln Phe Leu Ser Pro Leu Ser Asn Arg Arg Ser Asp Ala Trp Gly Gly
20 25 30

<210> 206
<211> 32
<212> PRT

<213> Archaeoglobus fulgidus

<400> 206
Gly Phe Asp Ala Val Gln Leu His Ala Ala His Gly Tyr Leu Leu Ser
1 5 10 15

Glu Phe Ile Ser Pro His Val Asn Arg Arg Lys Asp Glu Tyr Gly Gly
20 25 30

<210> 207
<211> 30
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: PCR primer

<400> 207
catcctggac tcggcccacc tcctcaccga 30

<210> 208
<211> 9
<212> PRT
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: polypeptide

<400> 208
Ile Leu Asp Ser Ala His Leu Leu Thr
1 5

<210> 209
<211> 33
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: PCR primer

<400> 209
gaggaggtag ccgtgggccg cgtggagctc cac 33

<210> 210
<211> 11
<212> PRT
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: polypeptide

<400> 210
Val Glu Leu His Ala Ala His Gly Tyr Leu Leu
1 5 10

<210> 211
<211> 32
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: PCR primer

<400> 211
ggctttccca tatggctcta cacccggctc ac 32

<210> 212
<211> 29
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: PCR primer

<400> 212
gcgtggatcc acggtcatgt ctctaagtc 29